SUGAR Y AZUCAR

ASOCIACION DE TECNICOS AZUCAREROS DE PUERTO RICO

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FAS-FLO FILTERS*

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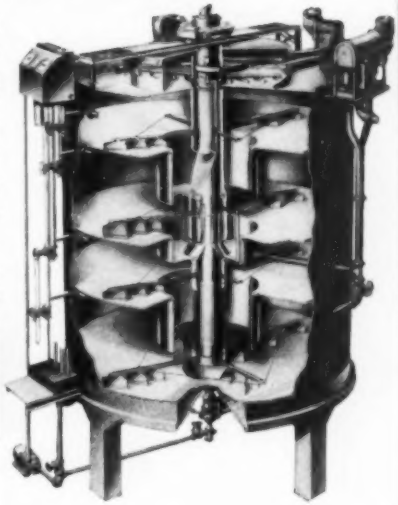
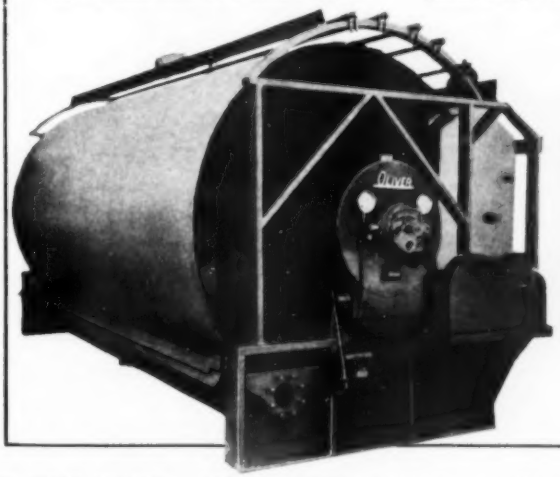
Write for your copy.



Oliver-Campbell Cane Mud Filters

Designed for long life and economical operation, Oliver-Campbell Filters incorporate the latest filtration developments resulting in efficient, low cost cane mud washing. Operating advantages include — less inversion of sucrose and less re-solution of impurities, higher purity filtrate, cleaner, more compact filtration station and accurate accounting of sucrose recovery. Hundreds of Oliver-Campbell Filters are used throughout the world. Bulletin No. 4093 gives the complete story. Write for your copy.



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Sugar y Azucar for November, 1959. Volume 54, No. 11 Published monthly by Russel Palmer Trust, Mona Palmer, Publisher. Publication Office, 109 Market Pl., Baltimore, Md. Editorial and executive office, 604 Fifth Avenue, New York 20, N. Y. Accepted as controlled circulation publication at Baltimore, Md.

SUGAR y AZUCAR

Volume 54 No. 11 November, 1959

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COVER *The emblem reproduced on our front cover and the illustration suggesting the division of sugar technology into the field and the factory sections points up the Annual Meeting of the Puerto Rican Sugar Technologists to which this issue is principally dedicated. The meeting on December 3, 4 and 5 will discuss many sugar problems of more than local interest; several of the papers of world interest are reproduced in this issue. Cover design by Jack Brown.*

PORTADA *El emblema y la ilustración en nuestra portada sugieren la división de la tecnología azucarera en dos secciones—la agrícola y la fabril—y señalan la Reunión Anual de la Asociación de Técnicos Azucareros de Puerto Rico, a la que esta edición va principalmente dedicada. Durante esta reunión los días 3, 4 y 5 de diciembre se discutiran muchos trabajos de interés más que local. En esta edición se reproducen varios trabajos de interés mundial. Diseño de la portada por Jack Brown.*

Publisher, MONA PALMER
Editor, E. W. MAYO, JR.
Technical Editor, DR. O. W. WILLCOX
Editor, Spanish Section, JOSE M. PEÑA
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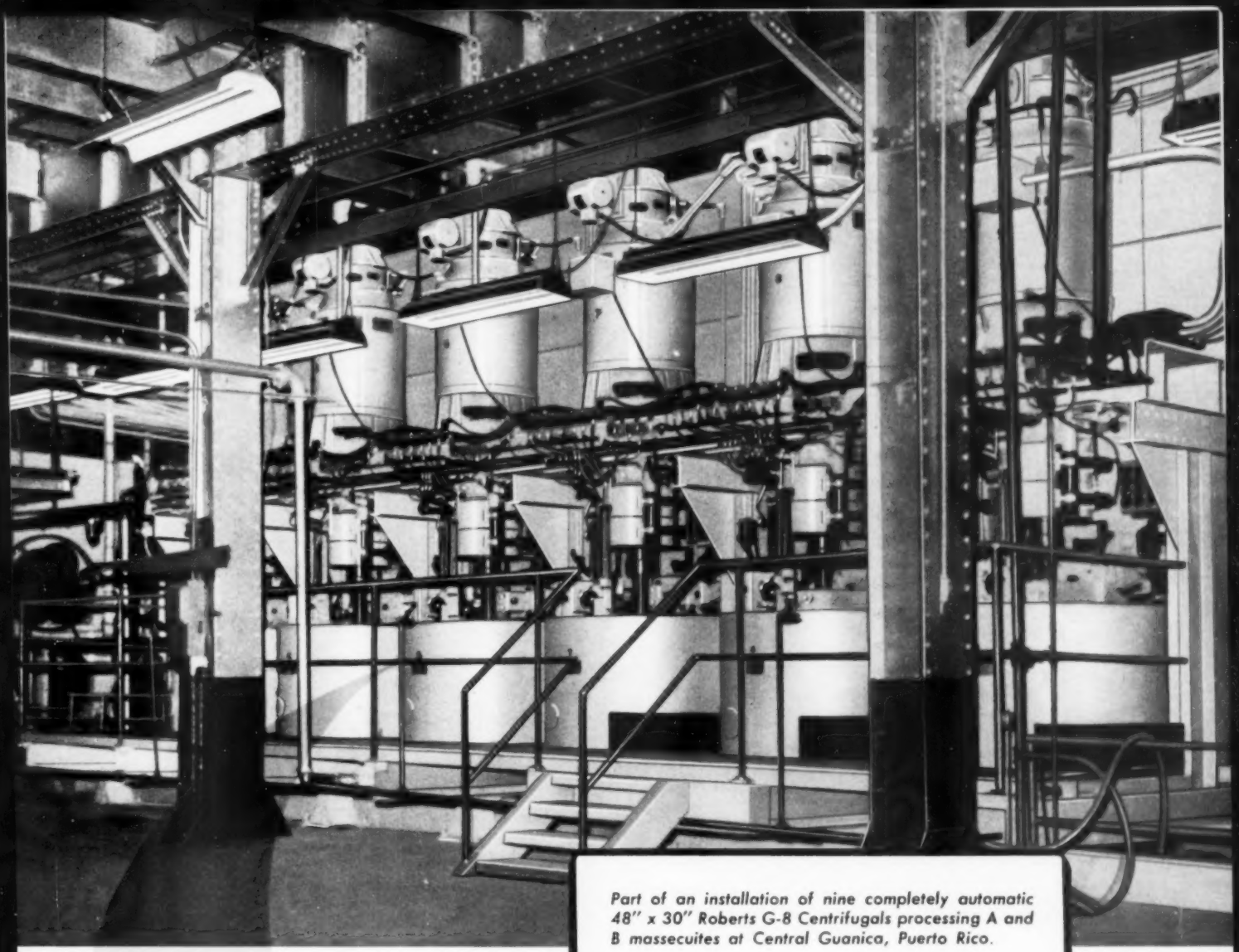

Part of an installation of nine completely automatic 48" x 30" Roberts G-8 Centrifugals processing A and B massecuites at Central Guanica, Puerto Rico.

NINE G-8s at Guanica

The South Porto Rico Sugar Company
operates Central Guanica
the largest raw sugar mill in Puerto Rico.
For centrifuging shipping sugar,
they installed nine
completely automatic 48" x 30" Roberts Centrifugals
for the 1957 crop.
And a powerful testimonial of satisfaction
is a second order
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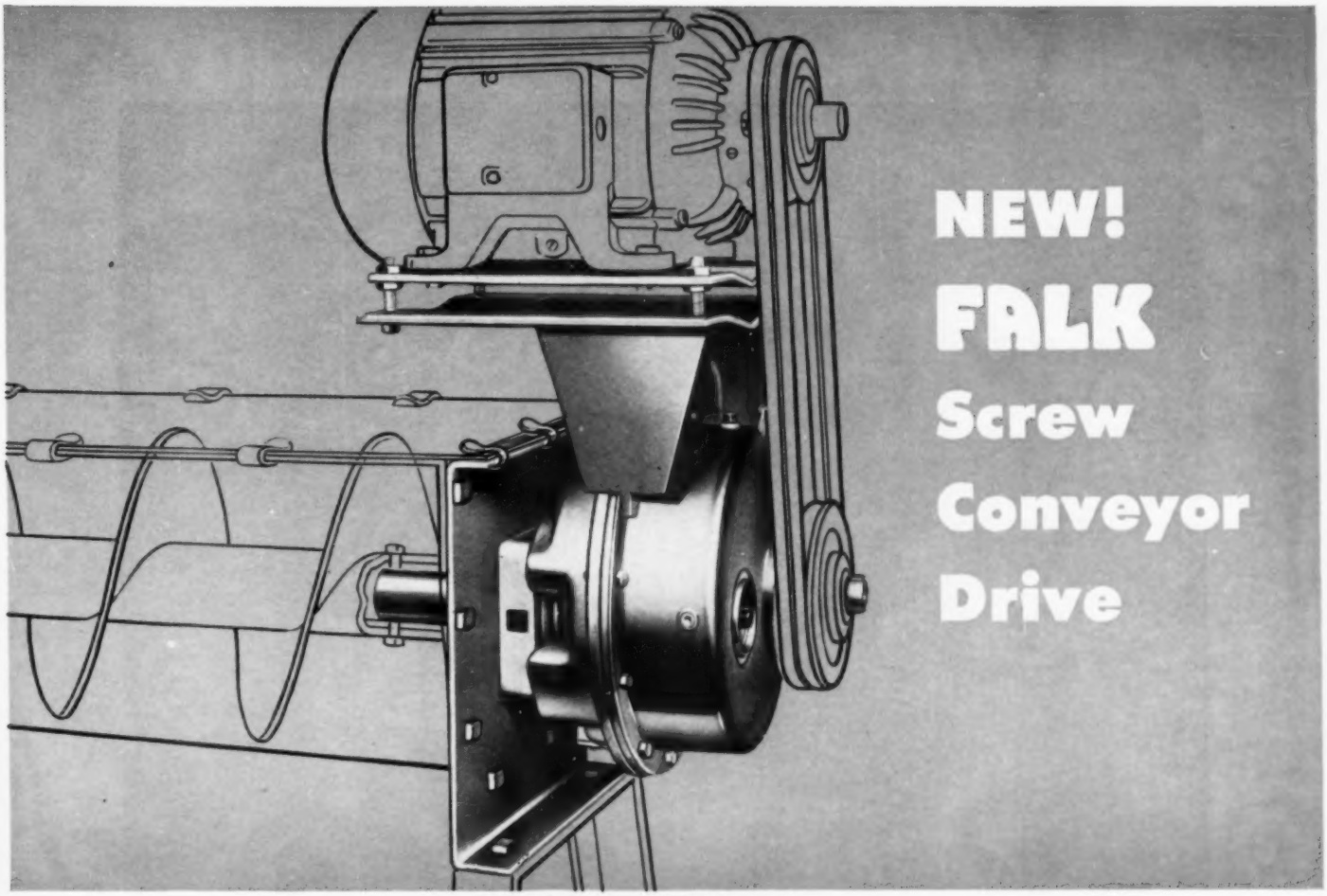

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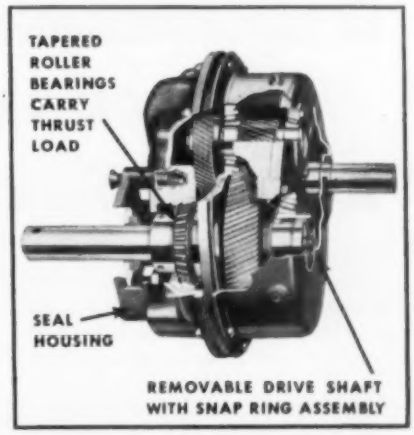

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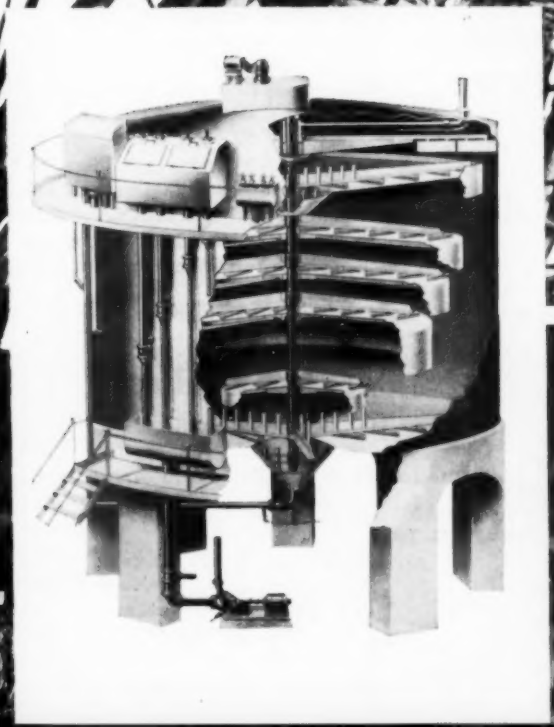

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CALL OR WRITE nearest Graver Representative for more information about improved Prima-Sep Sugar Clarifier, the most important advance in sugar clarification since the introduction of continuous treatment!

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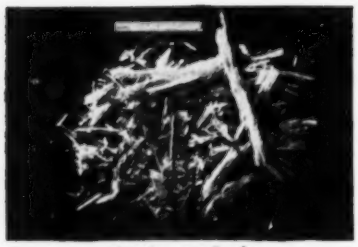
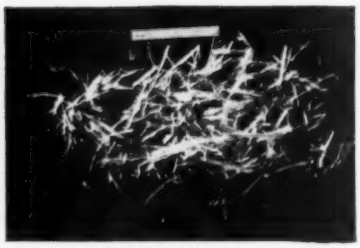
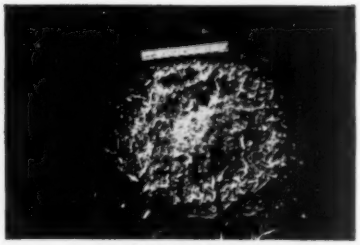


Raw Bagasse Feed

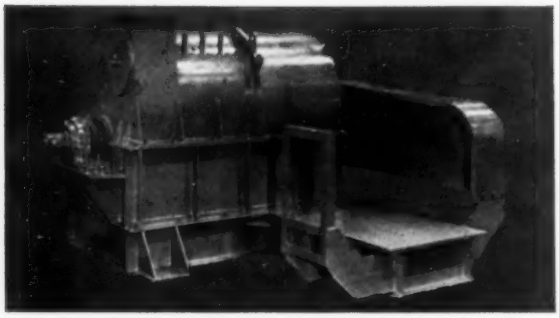


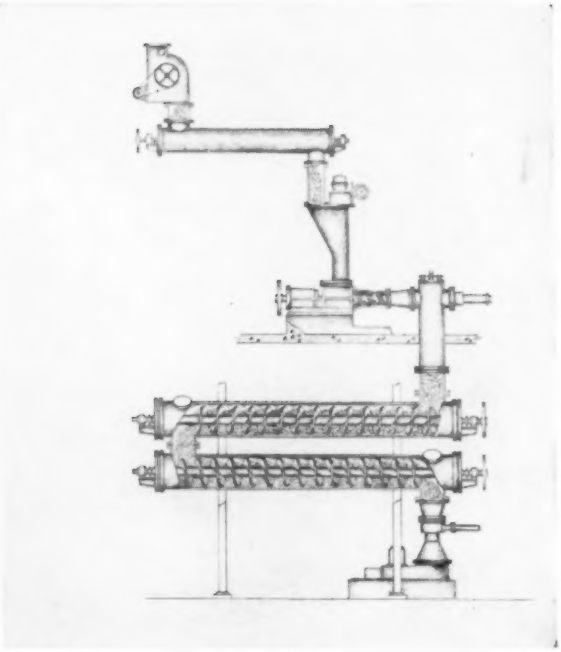
Fiber Product



Pith Fraction

A new team for producing high quality bagasse pulp at lower cost





The Horkel Depither

The Horkel Depither, developed by Louisiana State University and sold exclusively by Parsons & Whittemore, offers an economically sound solution to a problem that has limited the value of bagasse as a papermaking raw material.

By removing a high percentage of the pith and dirt at the sugar mill, the Horkel Depither produces a clean fiber which adds as much as 20% to digester capacity. Depithing also reduces baling, handling costs, saves on cooking and bleaching chemicals (ordinarily consumed by pith), and reduces maintenance problems in the paper mill.

The Pandia Chemi-pulper® Continuous Digester

The Pandia Chemi-Pulper Continuous Digester offers all the advantages of rapid operation and close quality control in a continuous pulping system that will produce highest quality pulp from bagasse (or any other cellulose materials).

The unit's compacting and feeding screws overcome the normal bulkiness of bagasse and result in high weight of material per cubic foot of digester space.

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For information on the Horkel Depither, the Pandia Chemi-Pulper Continuous Digester, or any other pulp or papermaking machinery, write to our nearest office.

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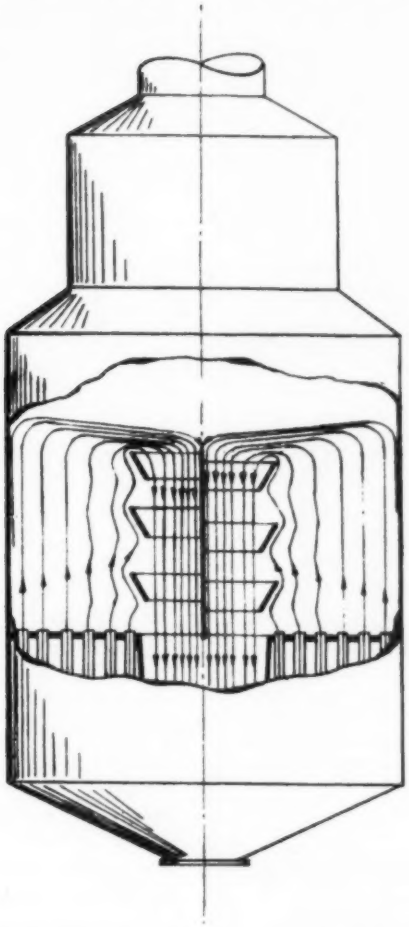
give top-to-bottom pan circulation



IMPROVE CIRCULATION IN YOUR CALANDRIA PAN BY INSTALLING HONIRON PATENTED LOUVERS IN TIME FOR THE COMING CROP!

LOUVERS are a design feature of the patented Hamill Low-Head vacuum pan of which two hundred thirty-eight have been installed in twenty-nine countries. In addition, fifty-three sets of louvers have been installed in existing pans.

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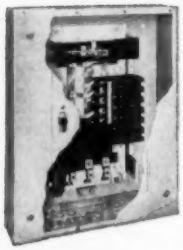
Space-saving panelboards protect vital circuits



Specify Westinghouse panelboards with exclusive AB De-ion® circuit breakers for maximum protection of lighting and distribution circuits. Featuring easy inspection and maintenance, flexible design of breaker and panel assembly can meet any job requirement. Fast-acting De-ion breaker provides visual "trip" indication. More facts in Booklet 8-F.

Planned lighting boosts production by 34%

That was the pay-off for a metal fabricator who followed the expert advice of a Westinghouse lighting specialist. Scientific planning of lighting systems for offices and plants can help you, too, to get better lighting for lower cost. Westinghouse makes a complete line of fixtures, including heavy-duty incandescent and fluorescent luminaires as shown here. Write for Booklet 8-G.

Only Thermalastic insulation could pass this test!

This photo shows you why Westinghouse Thermalastic® is called the "greatest insulation development since 1930". Engineers are flooding the exposed coils of a 600-hp motor running at 4160 volts. After spraying, the coils successfully withstood *three times* normal line-to-ground operating voltage.

While Thermalastic's superior moisture and dust resistance has special interest for mill operators, its other features are equally important. Tensile strength is 30 times that of ordinary insulation. Thermalastic won't loosen or crack under temperature changes — no matter how far it's stretched, it always returns to its original position.

Developed by Westinghouse, Thermalastic is available only on Westinghouse large motors, generators, synchronous condensers and frequency changers. For more information, write for Booklet 8-E.

For information on any of the Westinghouse developments shown here, or for help on specific engineering problems, write Westinghouse, Box 345, Wall Street Station, New York 5, U.S.A.

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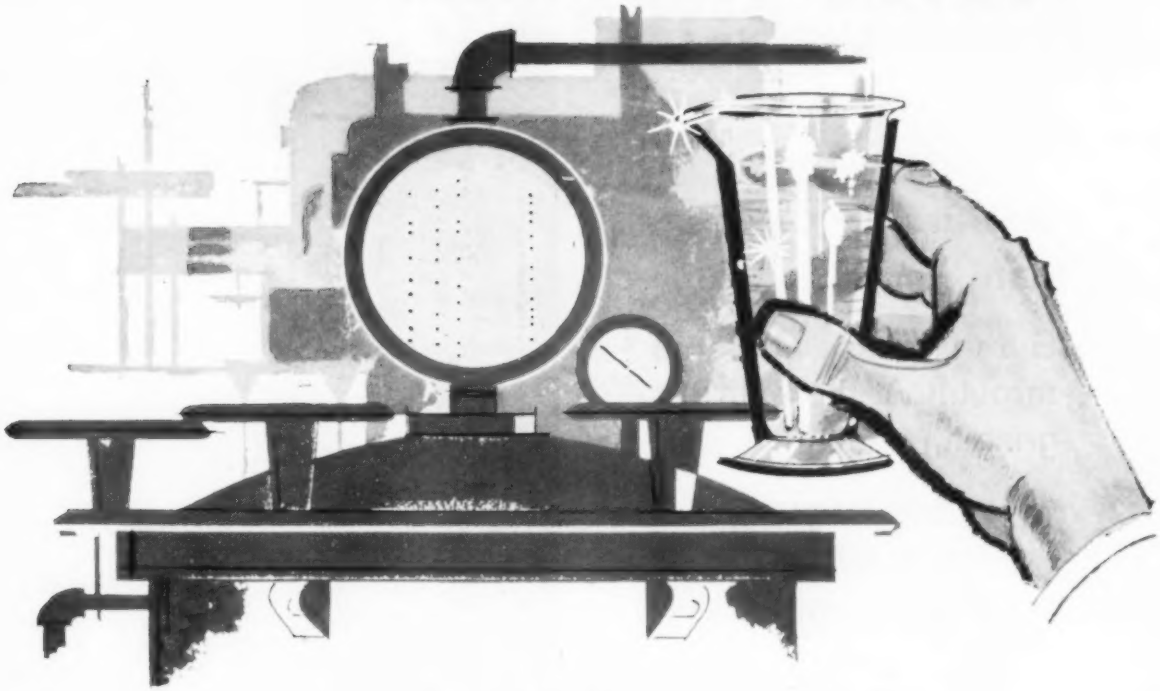

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☐ Please submit sample_____ (size needed)
Type Product to be filtered

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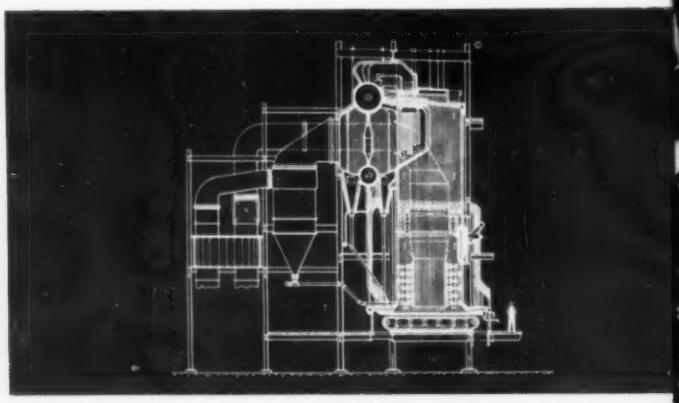
- with maximum steam output
- at minimum cost



C-E Vertical-Unit Boiler, Type VU-40, equipped with C-E High-Set Bagasse Stokers with continuous traveling grate; tangential, auxiliary oil burners and tangential air admission. Specially suitable for steam requirements above 125,000 pounds of steam per hour.

bagasse the better way

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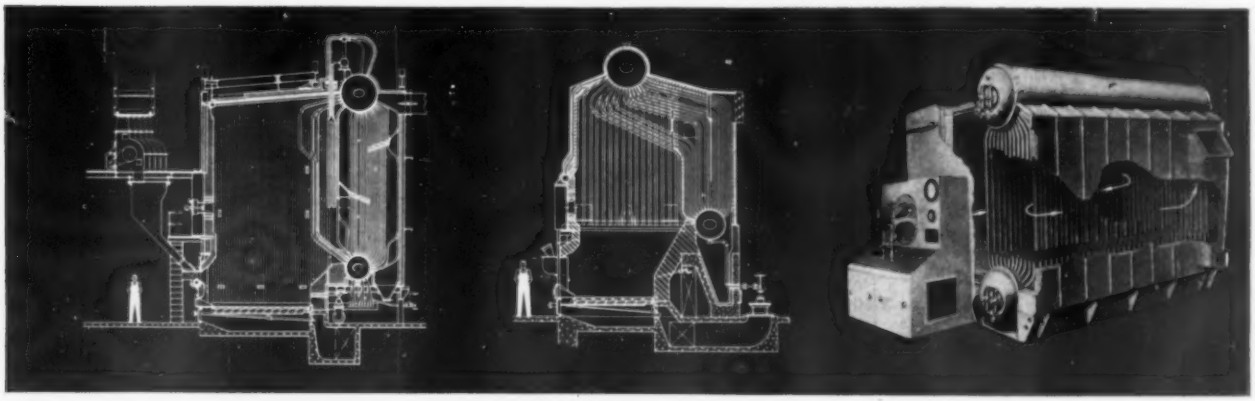
For prompt attention, get in touch with the representative nearest you or write to our Export Department in New York.



C-E Vertical-Unit Boiler, Type VU-50, equipped with C-E Bagasse Burning Stoker (Dump Grate Type). This design is suitable for steam capacity requirements up to about 125,000 pounds of steam per hour.

C-E Vertical-Unit Boiler, Type VU-10, equipped with C-E Bagasse Burning Stoker (Dump Grate Type). Units of this design are suitable for steam capacities from 15,000 up to about 50,000 pounds of steam per hour.

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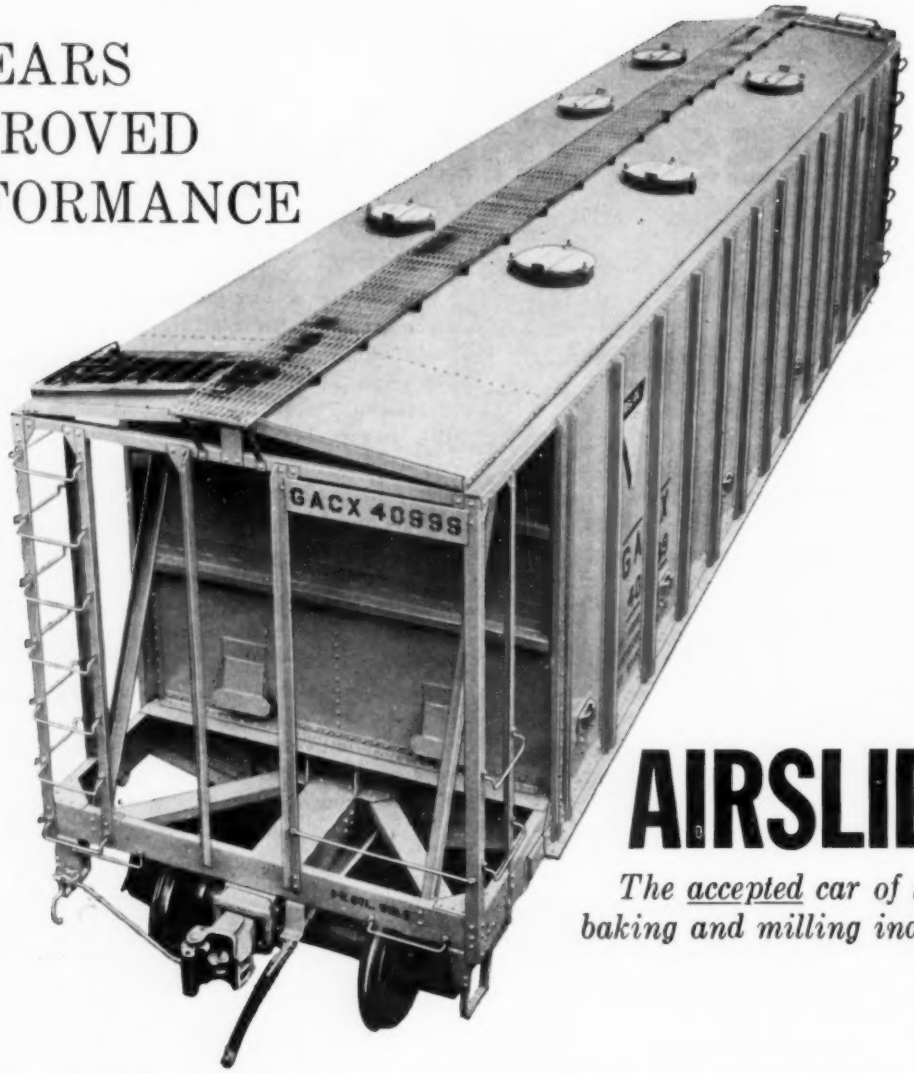

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4. Far more clearance for unloading

Where the volume warrants, the Airslide car can be used for bulk transportation of sugar. For further information on bulk shipping, call or write. You'll find, *it pays to plan with General American.*

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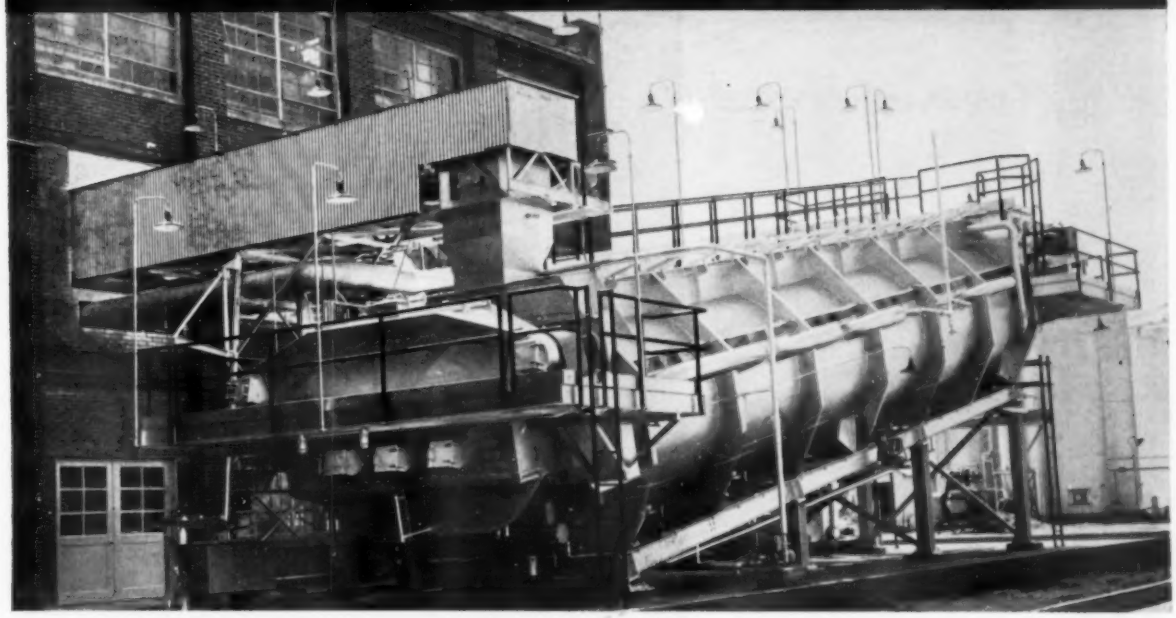
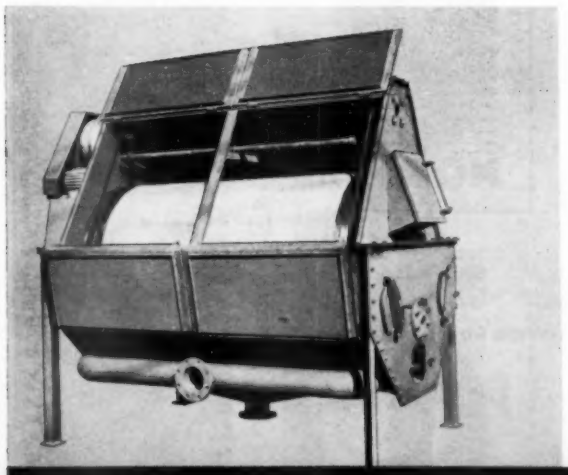
THE CURRENT SUGAR CAMPAIGN and SILVER SLOPE DIFFUSERS



More than half of all the sugar beet diffusion in this year's North American campaign is being processed in Silver-designed and built diffusers. Of the total an even dozen are the new Silver DdS* Slope Diffusers. These machines have earned a reputation for ease and economy of operation, high capacity and high juice quality.



THIS SEASON a new, non-foaming rotary screen has been added for use with Silver Diffusers. It effectively eliminates the foam problems of previous auxiliary screens. A recently developed Silver automatic slicer control is in use on a new Slope Diffuser, contributing unusually fine control with simple adjustment and permanent calibration accuracy. The control is competitive in cost and is economical in operation.

Your inquiry is invited

*DE DANSKE SUKKERFABRIKKER

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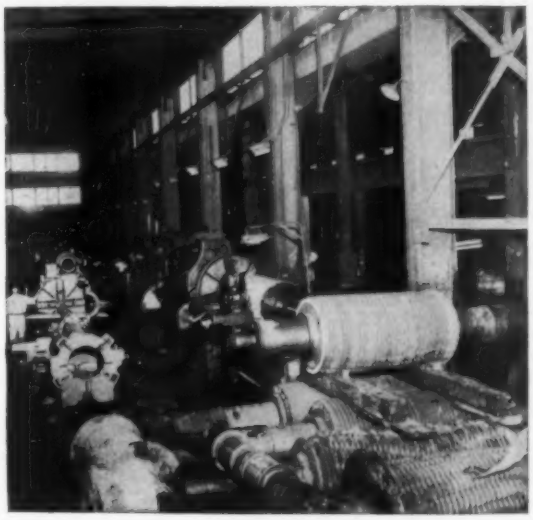

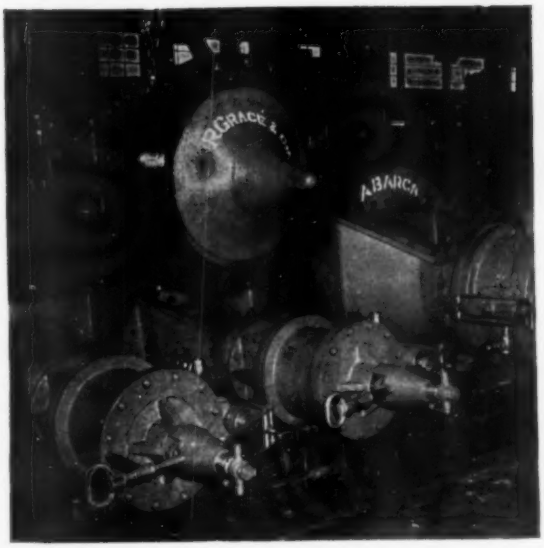

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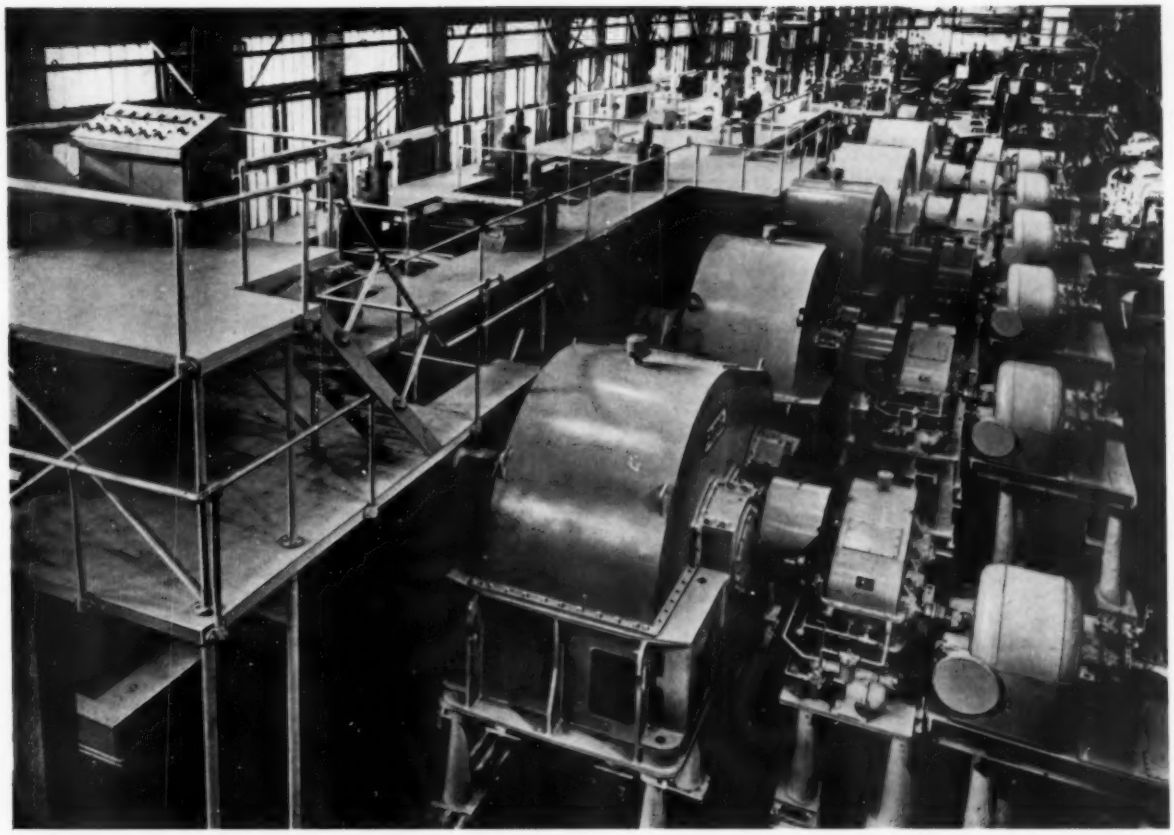

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But, these are only a few of the many improvements made. Send for bulletin 312 which tells the story in greater detail.

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geared for top economy and long wear

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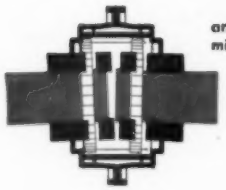
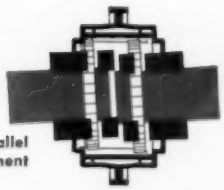


angular misalignment



parallel misalignment

Link-Belt Motor Couplings accommodate free angular and parallel misalignment.

Now you can afford flexible geared couplings on small electric motor applications. New Link-Belt MC motor couplings are *geared* couplings—the established standard of performance throughout industry. And at a new *low price*, these couplings are no longer too expensive for smaller motor applications.

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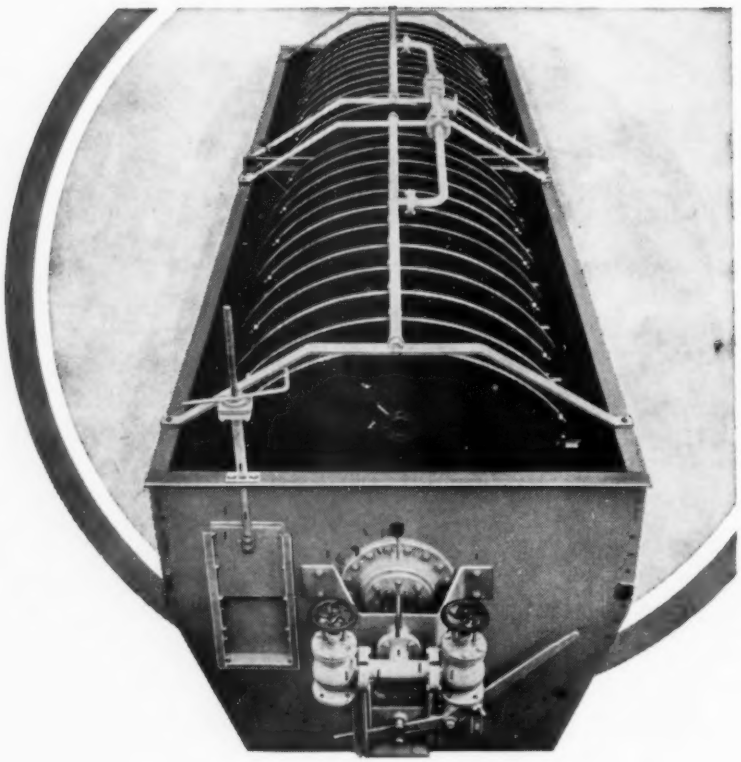

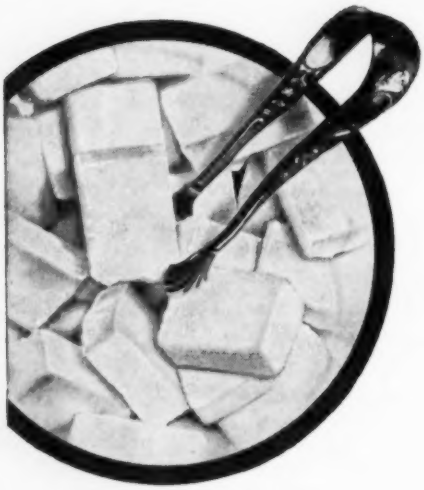

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With powerful 40 hp diesel engine and IH exclusive 8-speed "Agriomatic" transmission

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See your International Harvester distributor for details on the International Harvester German line of tractors and farm implements.

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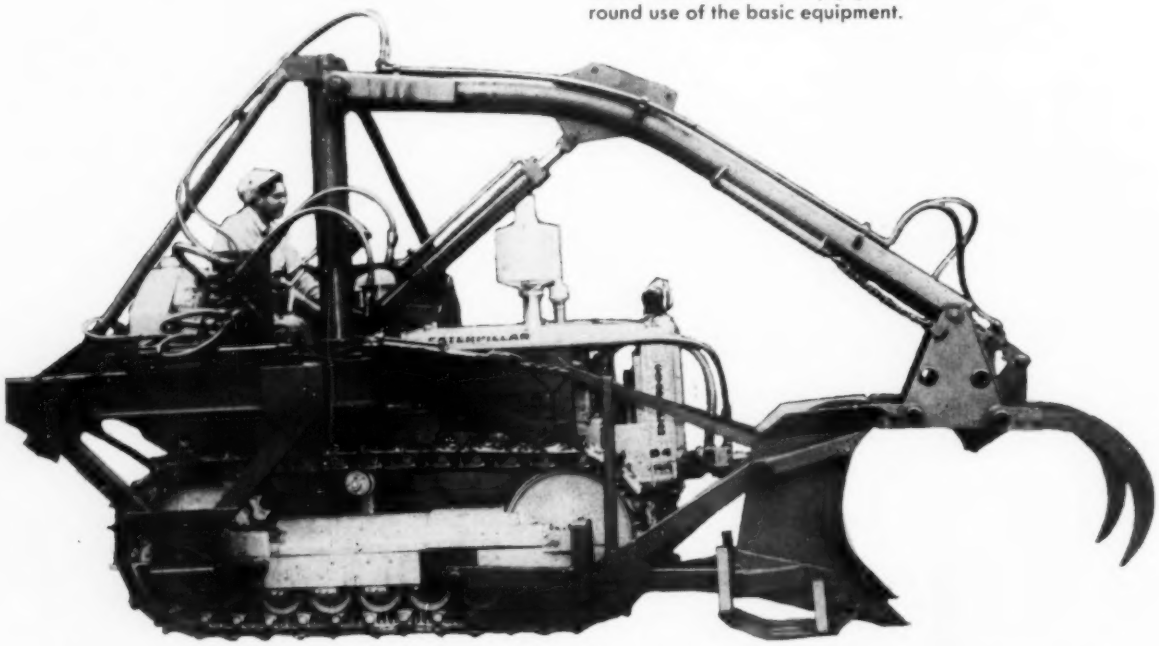

Crawler loader especially designed for the Caterpillar D-4 tractor can be mounted directly on tractor without tractor or control modifications. Available for 4 or 5 roller oscillating track frames.
Large and Medium capacity loaders are available for mounting on most wheel and crawler model cane field tractors.

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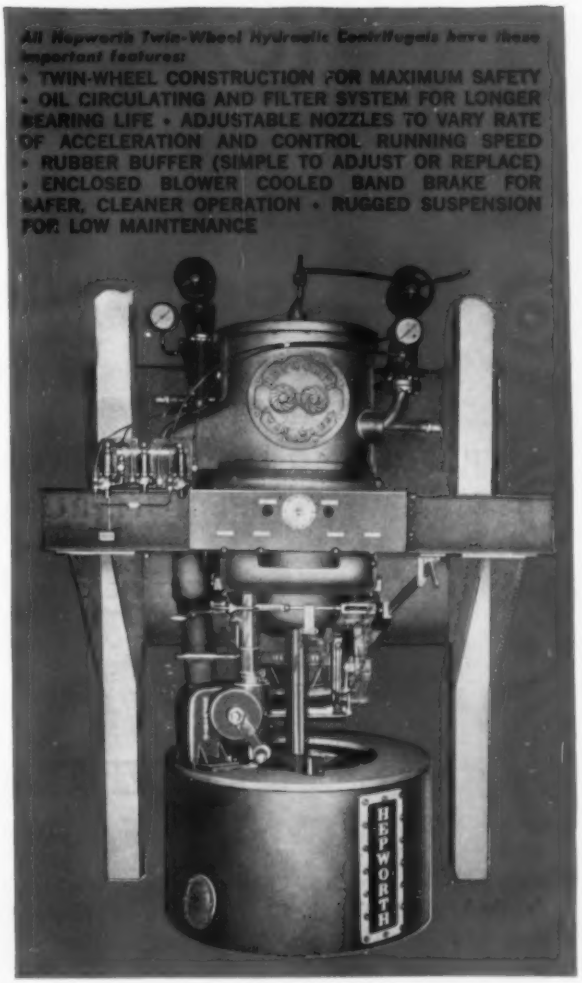

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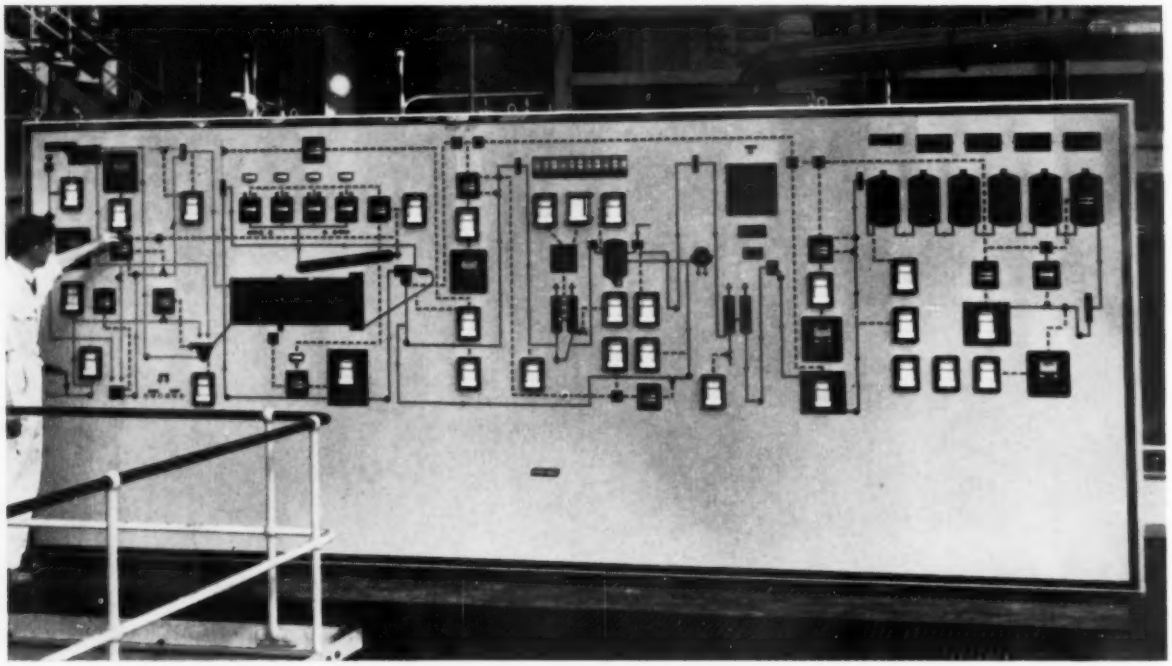

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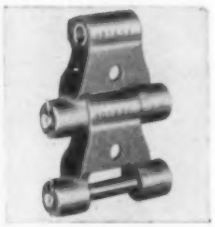

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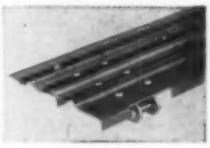

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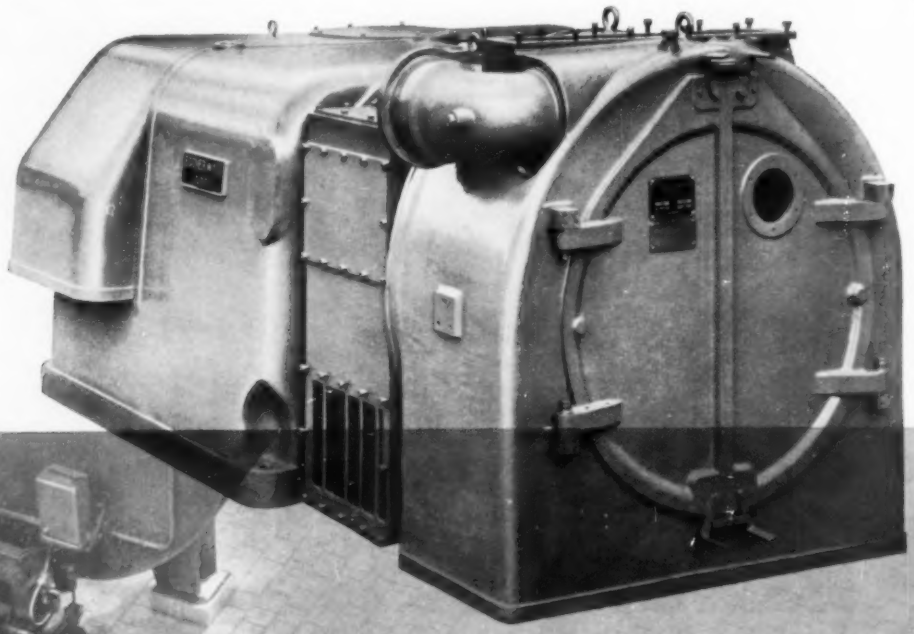
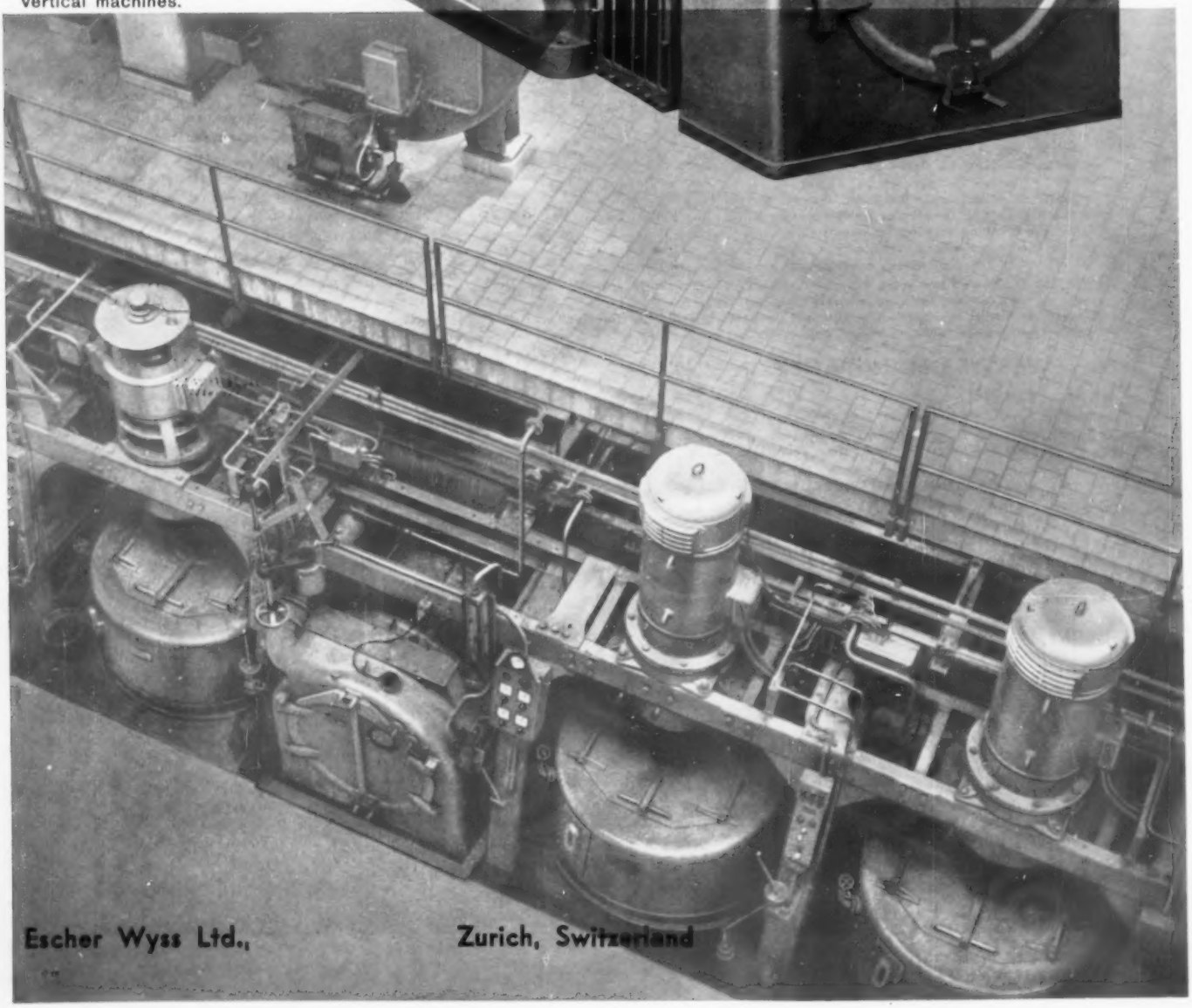


Escher Wyss Centrifuge as replacement in a battery of vertical machines.



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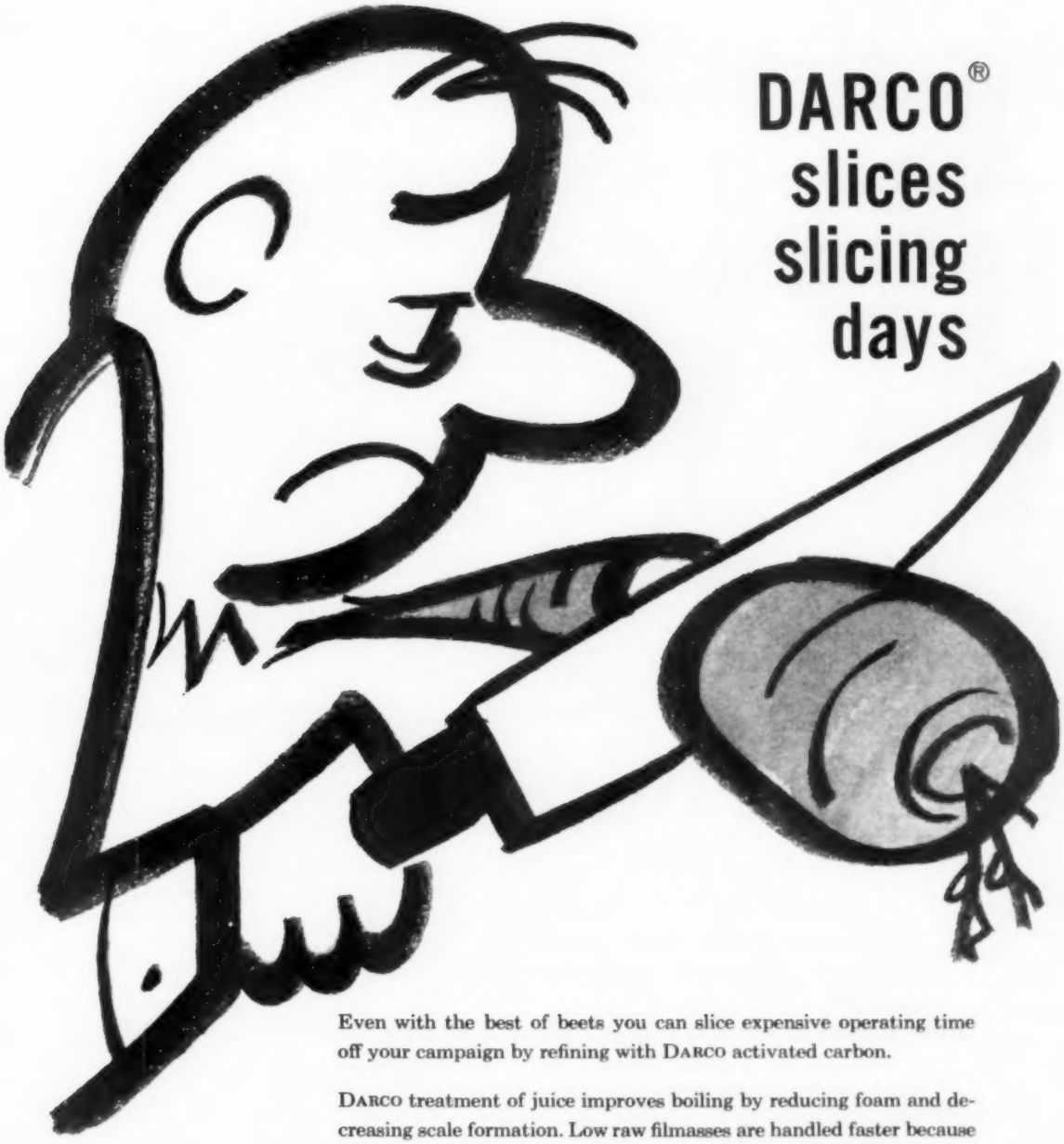

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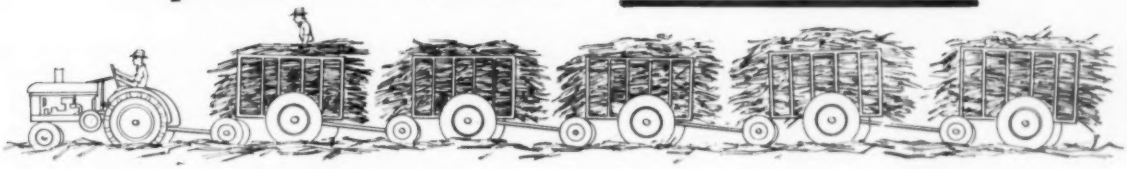

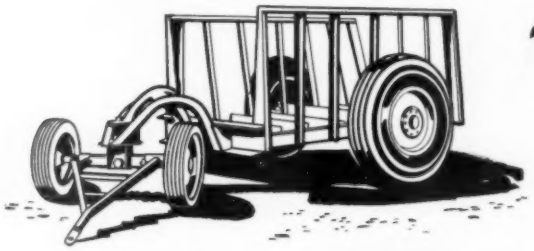

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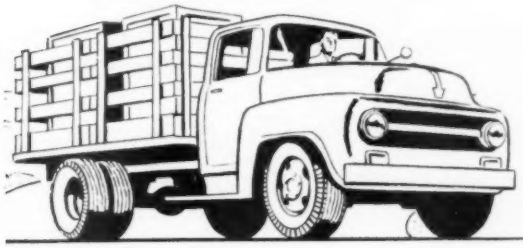

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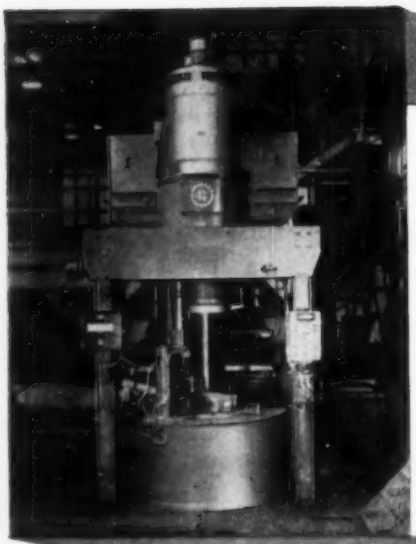

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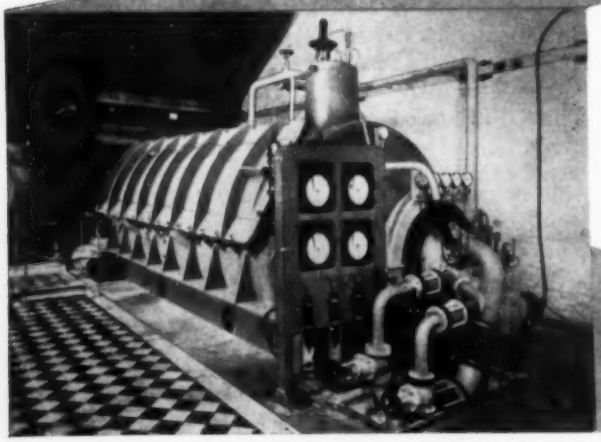

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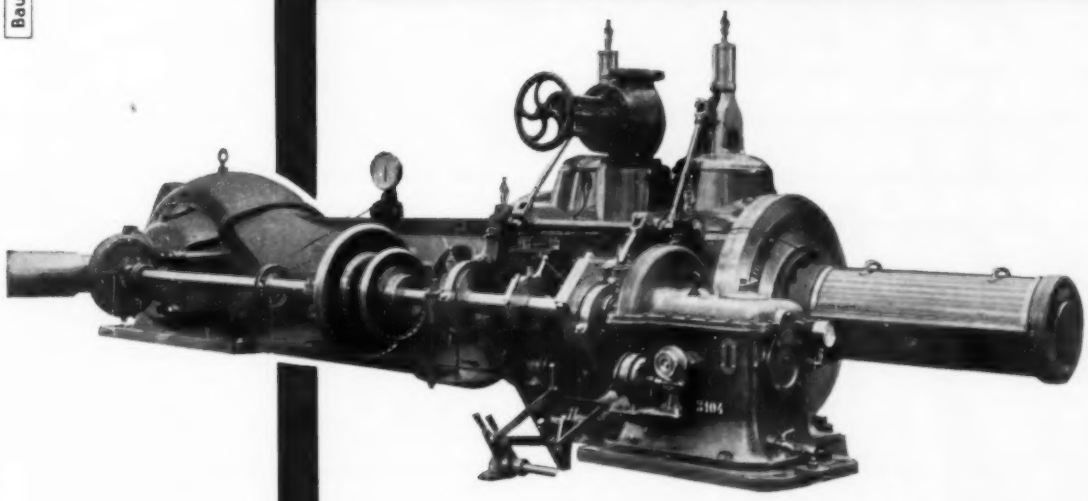

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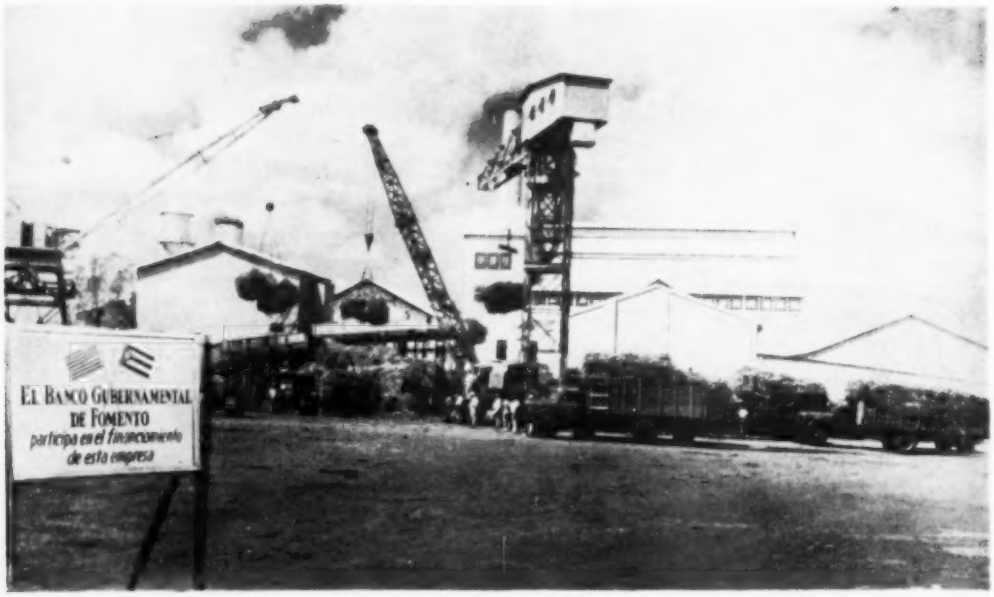

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Loans disbursed by the Government Bank since 1945 for the processing of agricultural products amount to $6,053,995. Loans disbursed to sugar mills alone for bulk-handling facilities and to replace working capital invested in factory improvement total $1,708,628. Those disbursed to agriculture and other industries related to agriculture are $1,253,600.

The Government Development Bank has also approved, but not yet disbursed, loans to industries related to agriculture in the amount of $4,070,000. This makes total loans disbursed and approved to industries related to agriculture amount to a total of $11,387,595.

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SUGAR

NOVEMBER, 1959

New Problems in a Changing Sugar World

President Outlines Theme Of Puerto Rican Technologists Meeting

By H. A. Willett,
President, Association of Puerto Rican Sugar Technologists

The members and guests of the Puerto Rican Sugar Technologists will gather on December 3rd, 4th, and 5th at the beautiful Caribe Hilton to discuss problems and developments that occurred during the past year. Though this year was probably one of the best in recent history, it was not lacking in problems and headaches for this group of operating personnel. It is the discussion of these problems by the different operating experts that should make this meeting an interesting one for all who attend.

Because of a very disappointing season in 1958 the industry as a whole purchased very little new machinery. The companies endeavored to improve their operations and get the most out of the equipment they already had. To do this many of the companies used industrial engineering with excellent results. These methods met with very strong opposition from some of the local labor unions. In most cases, after a proper selling program, the Unions were convinced that this new method of approach was best for both Union members and the companies. In these cases the programs were adopted. There were cases, however, where opposition was so great that the programs had to be dropped. To help this situation our local government has come to industry with a program of its own to assist in training personnel for the sugar companies and in setting up work standards for the whole industry. This program will be discussed at the meeting by Mr. Raúl Tous, who heads this department for the local government.

Keeping fields clean of weeds has become more and more important in Puerto Rico where a deficiency in our annual quota calls for greater production from our better lands. As in most cases stopping trouble before it starts is the best. Hence,

H. A. Willett

the greater interest in the use of pre-emergence system of weed control throughout the island. During the past year approximately 300% more area was treated in this form either by hand or by aero spraying. The experience and hardships encountered in starting this work in Puerto Rico will be discussed by both pilots and operating personnel at this meeting. The difference in views on the material to be used and the amounts should make this portion of the meeting a lively one.

With the increased area being planted to the modified Louisiana system operators are finding it more difficult to get into the fields with low clearance machines. This has forced them into stubble shaving of their ratoons, which was never done in Puerto Rico before. Members from three sugar companies that have done work in this field will give their experiences with this new operation.

The biggest problem confronting the mill group is the still larger amount of mechanically harvested cane received each year. Cane washers that were installed in some of the mills will be discussed by mill operating personnel. The variety of ideas and theories on this should bring on an interesting discussion. During the past three crops the percentage of mechanically harvested cane has risen from 10% to 30% of the total cane ground.

Much work has been done in the boiling houses on the handling of dirty juice. A progress report on the Elguanite process used at Cortada will be given. Central Guanica will contribute a paper on the use of Separan as an aid to their process.

Automation has become important to the mills that are faced with an ever increasing wage rate. Probably the most outstanding work on this is the automatic feed and mill regulation done at Central Igualdad. Emilio Morales, of their staff, will give a report of their first successful season with this equipment that they developed.

Starting a new practice, The Association sent to the International meetings in Hawaii two members as their representatives. These members will give a full report on their trip which include slides and movies taken at this event. Having previewed these films I can assure you that they are very complete and most interesting.

By presenting this preview of what will be offered at the meeting it is hoped that we have stimulated the interest of our members and prospective guests who attend this event. It is our desire that anyone connected with the sugar industry come to these meetings so that we may foster our program of the exchange of ideas among sugar men.

1959 PROGRAM ASSOCIATION

CARIBE HILTON

THURSDAY, DECEMBER 3rd

9:00 A.M. — REGISTRATION

9:30 A.M. — WELCOME ADDRESS—
Dr. Ramírez Silva.

10:15 A.M. — REPORT ON THE INTERNATIONAL SUGAR TECHNOLOGISTS MEETING—
Antonio Roig Jr., Héctor Mayol and Rubén A. Bonilla.

11:45 A.M. — PROGRESS THROUGH RESEARCH IN PUERTO RICO

12:15 P.M. — COLONO SERVICES OFFERED IN PUERTO RICO—
Guillermo Esteves Jr.

1:00 P.M. — COCKTAILS AND BUFFET LUNCH

FRIDAY, DECEMBER 4th

Section I Field Group:

9:00 A.M. — REGISTRATION AND COFFEE SERVICE

9:30 A.M. — STUBBLE SHAVING AT CENTRALS ROIG, AGUIRRE, AND COLOSO

10:00 A.M. — PROGRESS WITH HERBICIDES IN PUERTO RICO—
Nogueras, Luce and Co., P. Carreras, Central Mercedita, N. Cardona—Comunidad Agrícola Bianchi, and Frank Dupre.

10:30 A.M. — CURRENT STATUS OF NUTRITIONAL SPRAYING—
George J. Landrom

11:15 A.M. — INDUSTRIAL ENGINEERING PROGRESS REPORT IN PUERTO RICO—
Exio Mejía, Central Aguirre Sugar Co., Rafael Bird, Central Roig.

12:15 P.M. — FIELD MACHINERY MAINTENANCE PROGRESS AT LUCE & CO.—
Patrick Gray and W. Nelthropp.

1:15 P.M. — BUFFET—LUNCHEON

SUGAR TECHNOLOGISTS OF PUERTO RICO

SAN JUAN

Section II Mill Group

9:00 A.M. — REGISTRATION AND COFFEE

9:30 A.M. — THE CAPACITIES OF THE SUGAR MILLS IN PUERTO RICO AND THE LENGTH OF CROP—
Miguel A. Arsuaga Roure.

10:30 A.M. — AUTOMATIC FEED FOR A SUGAR MILL—
Emilio Morales, Central Igualdad.

11:15 A.M. — ELGUANITE PROCESS AT AGUIRRE MILLS—
Miguel A. Ballester Jr., Central Cortada.

11:45 A.M. — SEPARAN EXPERIMENTS AT CENTRAL GUANICA—
Roberto Ramirez.

12:15 A.M. — CANE WASHING AT CENTRAL CORTADA—
Central Cortada Staff.

12:45 P.M. — IMPROVED CANE KNIVES—
José A. Lomba.

1:15 P.M. — BUFFET LUNCHEON

SATURDAY, DECEMBER 5th

10:00 A.M. — WAGE INCENTIVE PROGRAM FOR CANE CUTTING—
R. J. Tous.

11:00 A.M. — BUSINESS MEETING AND ELECTION OF OFFICERS

12:30 P.M. — COCKTAIL PARTY FOR NEW AND OUTGOING OFFICERS

1959 EXECUTIVE COMMITTEE

HAROLD WILLETT	President	M. V. CAPLLONCH	Treasurer
CHARLES HAEUSSLER	Vice Pres.	RAFAEL HILERA	Secretary

Actual Application To Cane Cutting

Work Units & Incentives Plan

By Rafael Bird, Central Roig

As the economy of Puerto Rico expands, the labor force available to the sugar industry becomes smaller and the need for complete mechanization becomes more pressing, as pointed out by Raúl Tous, of the Puerto Rican Department of Agriculture and Commerce in a paper delivered at the Annual Meeting of the Sugar Technologists of Puerto Rico in San Juan on December 5th. Mr. Tous pointed out that during the transitional period, until mechanization of the sugar industry became complete, it is vital to increase the efficiency of the worker and this can best be done by the introduction of work units and incentives. This form of payment, says Mr. Tous, increases efficiency and reduces cost of production while the rise in the worker's income is an inducement for the worker to stay in the industry and strengthens the economy of Puerto Rico. During 1959 work standards were established taking into account variables such as cane varieties, soil conditions, land contour, weather, planting systems, age of cane, tonnage of field, burnt and unburnt cane, etc. Mr. Tous concluded by explaining that standard data in an easy-to-apply form, complete with a detailed manual of instruction for use of the data is under way and will be made available to the industry as soon as it is completed.

At the same meeting, on December 4th, Rafael Bird described the incentive method as applied to cane cutting on the plantations of Antonio Roig Sucesores during the last half of the 1959 crop. This article follows—*Editor.*

It has been the practice to pay for cane cutting by the day, all cutters receiving the same daily wage. The result of this system is the creation of an incentive to produce less, because a man with a large capacity for work gets no more than a man of small capacity, and he adopts the habit of not doing more than the other fellow.

In other places in Puerto Rico where they were paying by the day, the practice is to give an incentive of 5, 10, 15 cents more per day to the better men. In my opinion this system is not practical:

First, because it is based on arbitrary judgment.

Second, it often happens that a cutter will speed himself up for several days in order to win a high rating, and then drop back into his old routine; and when his rating is reduced he becomes discontented.

Third, there is no incentive in it for the large majority.

In other places work is carried on under a group incentive plan, which also has the inconvenience that all workers receive the same pay, whereas not all produce the same or at least do not have the same productive capacity, and the result is that they do not win the maximum reward.

The cutting of cane by incentive at Antonio Roig Successors is voluntary and individual. It is based on payment of a daily wage that is just and reasonable for a reasonable amount of work. This reasonable amount of work is measured scientifically by time studies, and is equivalent to normal production under certain conditions in a certain period of time.

The benefit of our system is that we obtain the normal production of each cutter and the worker is paid for all he produces above the normal. Every effort put forth above the normal redounds to the worker, and since this extra effort is measured by the scientific methods of industrial engineering, the cutting by incentive is not negotiable with the unions.

For measuring the productivity of each man we decided to use the unit system employed by Luce & Co., and Messers Hanson and Mejias of that firm gave us their cooperation; we have benefited from their vast experience.

The unit of work used in this system is called a "vara", and consists of six rows of cane each five feet wide and nine feet long, which amounts to an area of 270 square feet. Since there are 42,305.44 square feet in one cuerda (Spanish acre) there are 156.7 varas in one cuerda.

The "standards" determined by Barrington International, Inc. are expressed as minutes per vara, or the amount of time in minutes required by a laborer working normally, to cut one vara of a certain variety and class of cane yielding a certain tonnage of cane per acre. Thus, on level land (like that in Louisiana) the standard for a spring planting of the variety H32-8560 yielding 51 tons per cuerda is 24 minutes if the cane has been burned.

Procedure: Each cutter works on two rows, and two cutters throw their two rows into one pile. The overseer measures the

Pre-emergence spraying at the Agricultural Experiment Station, Rio Piedras, Puerto Rico, using modern methods and equipment for weed control. Picture courtesy, the Experiment Station.

length of the varas of the rows which each worker has cut. Since, by definition, a vara is composed of six rows, nine feet long and the worker is working on two rows he has to cut 27 feet of two rows to make one true vara.

The teams of cutters must necessarily be small, about 26 or 28 men, because the overseer not only has to supervise the cutting but also must keep the cutters' time, and measure the linear varas. A capable and experienced overseer can have a somewhat larger number of workers. He also has to give special attention to the quality of the cutting, that is, to see that the cane is cut flush with the ground and that proper piling of the cut cane is done so that the loader may pick it up most efficiently. There is a tendency in incentive cutting to slight these requirements due to the eagerness of the cutter to cut a maximum number of varas. The overseer also records the time each cutter has worked which is necessary for the final calculations.

We will take as an example a cutter who is cutting burnt spring cane yielding 51 tons acre of variety H32-8560 at a standard of 24 minutes per vara. The cutter cuts 28 linear varas at one round, 28 linear varas in another round and 10 linear varas of a third round, and has worked a total of seven hours and five minutes. This is the information that the overseer gives to the timekeeper.

The timekeeper consults a table that contains the following data, and the current market price of sugar. We will assume a price of $6.35 for sugar.

Price of sugar	$6.31-6.40
Basic Wage	3.10
Subsidy	.585
Daily Wage	3.685
Wage per Minute	.007677
Daily Wage, Burnt Cane	5.528
Wage per Minute, Burnt Cane	.01152

The cutter has cut 28 plus 28 plus 10 linear varas for a total of 66 linear varas which, divided by three, equals 22 real varas. Multiplying the 22 real varas by the standard 24 minutes per vara we obtain a total of 528 minutes. The cutter actually worked seven hours and five minutes or a total of 425 minutes; hence the percent production is equal to $\frac{528}{425}$ or 124%. The wage earned is 528 productive minutes worked multiplied by the minimum value of minutes in the above table, $0.01152 or $6.08.

From this data we know the number of real varas that have been cut which should coincide with the number of real varas reported by the overseer. We accept a variation of up to two percent; any greater variation is immediately investigated.

It is indispensibly necessary to educate the personnel not only in procedures and calculations, but also in the benefits of the plan, and to carry out the system in a way that will win the confidence of the worker and the union.

Typical scene in Puerto Rico during the harvest; cane is unloaded from carts and loaded on rail cars for delivery to the mill. This form of mechanical handling has been practiced for years.

Following the advice of Mr. Mejias we held meetings with groups of administrators, timekeepers and overseers and assigned the parts of each in the plan; these meetings were highly useful.

This plan is based on production per day; if a cutter produces per day 120% today and 95% tomorrow he will receive 120% and 100% respectively, since he is guaranteed the minimum wage.

Once an estimate has been made on a job, the estimate may be readjusted upward, but never downward. If a task has been estimated to produce 45 tons and it turns out to be 42 tons we pay for 45 tons; if it should happen to be 48 tons, it will be correspondingly adjusted.

We have found that there is some advantage in announcing the price of sugar at about 9:00 a.m., which is about the time the piling of cane begins, rather than before cutting begins.

If an administrator makes a mistake in estimating the job and this mistake turns out to be in favor of the worker, he is not permitted to revoke the excess payment.

The plan is completely voluntary. We specify what a day laborer should produce, and we add an incentive that if he produces more than the "standard" he will be paid for it.

It has been necessary to issue bulletins from which the workers can see how much money they will receive per vara, instead of minutes per vara.

In concluding, before stating the costs per ton from cutting under incentive, I desire to mention an experience that is of importance when beginning to cut under the incentive plan in places where it has previously been done by the day.

When work is being done by the day without incentive, a man becomes accustomed to a slow rhythm in his cutting, and when cutting by incentive is introduced it takes him several days to work up to a rhythm that he can sustain for six to seven hours. In our first cutting under this system there were men who started off with a rhythm that left them exhausted after three hours, and this produced an unfavorable reaction to the plan. Fortunately, however, the Barrington representative informed us that this situation is normal at the beginning of every incentive plan. From that time on, at the beginning of each new cutting, we have told the men about this experience, and advised them not to start at too fast a rate. But there is always a group that works at an accelerated rate for four, five and six hours, with a percentage production of 160% to 177% and even more.

The first cutting began about the 19th of March. At this date we were cutting 158,187.27 tons of cane a day and finished by cutting 225,580.60. In this latter period under incentive we were cutting 60,520 tons at $0.99 against a cost of $1.45 for the 323,249 tons that were cut by the day.

El Ejemplo mill in eastern Puerto Rico with a capacity of 1560 tons of cane per day is located in a beautiful setting just off the main highway from Humacao to Yabucoa.

Suggestions For Rationalizing The Industry

Mill Capacity & Length Of Harvest In Puerto Rico

By Miguel A. Arsuaga Roure

The following article is a transcript of the general conclusions reached by the author on the subject of factory capacity in relation to the length of the harvesting season. He is of the opinion that the ideal situation for Puerto Rico would be represented by a group of larger factories with fewer smaller ones, all operating on a number of cane varieties with high sugar content that could be harvested in succession over a period of eight months. He admits that this is an explosive proposition and he states his position with vigor and directness. The full text of the paper which was written for presentation to the 1959 Meeting of Puerto Rico Association of Sugar Technologists, should be consulted for details. *Editor.*

By study of cases summarized in the accompanying table it is apparent that, in general, there is a crop of a certain size for every size of factory and a certain maximum of profits on each ton of cane. If the size of the factory is increased, the size of the crop should be increased in a proportion which seems to be approximately double the daily capacity.

But if the crop is expanded too much, the sugar rendement will decrease, because a larger area has to be covered in which the actual sugar yield will be below the curve of maximum sugar content as the season progresses (see Fig. 4); that is, much cane will be harvested that is not fully ripe. In my opinion this point is confirmed by the low yield that has been noticed in recent years and which the press has had difficulty in explaining. Certainly, it appears to be clear, from the table, that in the scheme under which the crop is being harvested in Puerto Rico, the idea of increasing the capacity of the mills in order to grind the same quantity of cane is an error, unless the increase of capacity is obtained through a relatively small investment, or unless the relation crop-capacity-yield warrants it.

This does not mean that an increase of the grinding rate in a factory should be shunned under any condition where the duration of the harvest is short. If under special circumstances the harvest increases considerably, it certainly is not practical to install two small centrals instead of one of double capacity, because the initial investment and fixed costs in the combination will probably be more than double in the two centrals, than in the larger one and the consequence will be a loss of economic advantage and a deterioration of competitive position.

But all this indicates that the supercentrals of large capacity are not necessarily the solution for the problems of the industry, and that the increase of capacity

(*Continued on page* 52)

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Write for Bulletin F-2051

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CENTRALS
NUMERALS INDICATE DAILY GRINDING CAPACITY IN TONS
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N SEA
VIRGIN ISLANDS
BETHLEHEM
1600
CHRISTIANSTED
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O RICO

Economic Characteristics Of

Table I

CASE	*A*	*B*	*C*	*A*
Yield	10.5	10.5	10.5	11.5
Capacity	3,000	3,000	3,000	3,000
Price	5.25	5.70	6.25	5.25
1. Total Harvest, Tons	300,000	300,000	300,000	300,000
2. Daily Capacity, Tons	3,000	3,000	3,000	3,000
3. Effective Milling Days	100	100	100	100
4. Days of Harvest	120	120	120	120
5. Yield, %	10.5	10.5	10.5	11.5
6. Sugar Produced, Tons	31,500	31,500	31,500	34,500
7. Molasses Produced, Gals.	1,500,000	1,500,000	1,500,000	1,500,000
8. Price of Sugar per Ton	105	114	125	105
9. Price of Molasses per Gal.	7c	7c	7c	7c
10. Total Sugar Sales	3,307,500	3,591,000	3,937,500	3,622,500
11. Total Molasses Sales	105,000	105,000	105,000	105,000
12. Total Sales, Dollars	3,412,500	3,696,000	4,042,500	3,727,500
13. Total Value of Property	2,500,000	2,500,000	2,500,000	2,500,000
14. Value of Property, Minus Land	2,491,000	2,491,000	2,491,000	2,491,000
FIXED COSTS				
15. Depreciation, 5% year		124,550		
16. Contribution of Property @ 1.6%		40,000		
17. Repairs, Dead Time, etc. (est.)		120,000		
18. Security		60,000		
19. General Fixed Cost		60,000		
20. Salaries Permanent Employees		50,000		
21. Total Fixed Costs	454,550	454,550	454,550	454,550
VARIABLE COSTS				
22. General Variable Costs		40,000		
23. Variable Salaries and Wages		170,000		
24. Materials		30,000		
25. Purchased Electric Power		3,000		
26. Repairs During Harvest		30,000		
27. Transport of Cane		225,000		
28. Jute Bags		97,650		
29. Market Costs		450,000		
30. Expedients		31,500		
31. Total Variable Cost of Operation	1,077,150	1,077,150	1,077,150	1,132,450
32. Colonos Participation in Sugar	1,910,812	2,025,945	2,249,438	2,049,822
33. Colonos Participation in Molasses	12,000	12,000	12,000	12,000
34. Variable Costs	2,999,962	3,115,095	3,338,588	3,194,272
35. Total Variable and Fixed Costs	3,454,512	3,569,465	3,793,138	3,648,822
36. Profits Ex-contr. Over Receipts	42,012	126,535	249,362	78,678
37. Profit % Invested Capital	1.68	5.06	9.97	3.15
38. Factory Profit $/ton Cane	0.14	0.421	0.831	0.262
39. Critical point of Milling, Tons Cane	337,500	255,000	193,750	257,500

of a particular central does not necessarily give it a greater economic advantage, if this increase in capacity is obtained on the basis of a greater capital investment per ton of sugar, along with an increase of other problems of reserves and personnel.

All this points up the necessity of improving the extraction and recovery in the factory, and of increasing the yield with a minimum of investments; it also points up the importance of enlarging the crop by operating on canes with high sugar content, which will reduce fixed costs in proportion to the factory's total economy. It discloses the necessity of reducing fixed and variable costs in field and factory by discovering and utilizing every opportunity that presents itself; there is no need to spend blindly, and spending may be done only when it can be done to reduce costs.

On the other hand, we have seen that the larger central produces more sugar than the smaller one, with the same cane, from which it may be deduced that a number of super-centrals of high capacity will be able to cover the sugar quota of the Island, utilizing less land.

But the question is, how to improve these characteristics of the industry that condemn us to an economy of anxiety and vicissitudes? The sugar quota fixes the crop of cane in the Island; the relation crop-capacity fixes the Island's milling capacity; the capacity fixes, in part, the yield; and the price of sugar fixes conditions beyond our control, and to a large extent fixes wages, cost of materials, etc. There can be no doubt that we are condemned to struggle with the two or three factors that are not under our control.

It is apparent, when the matter is looked at realistically, that we have under our hand yield, size of crop, duration of harvest, grinding time, mill capacity, and cane varieties as the factors that have a large effect on the sugar economy, among which we may find a solution for the gloomy sugar perspective.

It is therefore from among these factors there will come a realistic solution that we need.

The three factors which have the most effect on the sugar economy are the yield, the price of sugar and the size of the crop.

We can improve the yield by shortening the length of the harvest time by providing more super-centrals, and by planting better varieties of cane. But the super-central will further aggravate the labor problem, and will tend to come to a limit as regards investment per ton of sugar, or per dollar of profit.

As regards the price of sugar it is so far out of our control that there is no use to discuss it. The same may be said about the maximum total harvest.

And here is where we may find the way out. Now that we have examined various synthetic operations that lie within the

Sugar Centrals-Long Harvest

Table II		Table III			Table IV		
B	*C*	*A*	*B*	*C*	*A*	*B*	*C*
11.5	11.5	12.5	12.5	12.5	13.5	13.5	13.5
3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
5.70	6.25	5.25	5.70	6.25	5.25	5.70	6.25
300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000
3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
100	100	100	100	100	100	100	100
120	120	120	120	120	120	120	120
11.5	11.5	12.5	12.5	12.5	13.5	13.5	13.5
34,500	34,500	37,500	37,500	37,500	40,500	40,500	40,500
1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000
114	125	105	114	125	105	114	125
7c	7c	7c	7c	7c	7c	7c	7c
3,933,000	4,312,500	3,937,500	4,275,000	4,687,500	4,252,500	4,617,000	5,062,500
105,000	105,000	105,000	105,000	105,000	105,000	105,000	105,000
4,038,000	4,417,500	4,042,500	4,380,000	4,792,000	4,357,500	4,722,000	5,167,500
2,500,00	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000
2,491,00	2,491,000	2,491,000	2,491,000	2,491,000	2,491,000	2,491,000	2,491,000
	124,500						
	40,000						
	120,000						
	60,000						
	60,000						
	50,000						
454,550	454,550	454,550	454,550	454,550	454,550	454,550	454,550
	40,000		40,000			40,000	
	170,000		170,000			170,000	
	30,000		30,000			30,000	
	3,000		3,000			3,000	
	30,000		30,000			30,000	
	225,000		225,000			225,000	
	106,950		116,250			125,550	
	493,000		535,000			576,315	
	34,500		37,500			40,500	
1,132,450	1,132,450	1,186,750	1,186,750	1,186,750	1,240,365	1,240,365	1,240,365
2,253,200	2,501,772	2,262,662	2,487,100	2,761,412	2,291,287	2,537,325	2,838,037
12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
3,397,650	3,646,222	3,461,412	3,685,850	3,960,162	3,543,652	3,789,690	4,090,402
3,852,200	4,100,772	3,915,962	4,140,400	4,414,712	3,998,202	4,244,240	4,544,952
185,800	316,728	126,538	239,600	377,788	359,298	477,760	622,548
7.43	12.67	5.06	9.58	15.11	14.37	19.11	24.90
0.619	1.055	0.421	0.798	1.259	1.197	1.592	2.075
216,750	180,000	238,000	200,000	167,500	165,000	143,750	127,000

actual format of the short harvest and the high capacity of the centrals, we may proceed to see what happens when we find a way to make the same sugar per year within the liberty of action we have mentioned.

Speaking now in terms of round numbers we may say that our sugar quota is 1,200,000 tons of sugar. At a sugar yield of 12% this is equivalent to 10,000,000 tons of cane.

We may mill this cane in 100 days as is now being done with a total milling capacity of 100,000 tons per day, or we may grind for 200 days at the rate of 50,000 tons per day, assuming that the fields will be planted with the best varieties of cane in such a way that all the time we will be grinding cane that will contain as much sugar as we now get during the month of April.

By a happy coincidence the average capacity of the Puerto Rican centrals is about 3,200 tons per day. We will need 16 of such centrals to take care of the crop and the quota, grinding 200 days a year, which will be about eight months. Or, we may accomplish the same result with 30 centrals with an average grinding capacity of 1,700 tons per day. The central with a capacity of 3,200 tons/day will mill a crop of 640,000 tons. The central with 1,700 tons/day capacity will grind a crop of 340,000 tons.

In other tables and graphs we see what happens when different patterns of operation are followed.

From this present analysis we may at least draw the following conclusions:

1. Without doubt the centrals working on a long harvest represent a sugar economy more healthy and more stable than centrals working on a short harvest, both as regards the fabrication phase and the agricultural phase, and also as regards the labor sector.

2. The wage cost is apparently getting into a state of chaos that is unnecessary. Now what will we gain when we have cane of high sugar content during eight months instead of four?

Many experts in the matter are of the opinion that this is entirely possible and technically easy to accomplish. Last year an official of the Agricultural Experiment Station pointed out the viability of the required technique. Certainly, if it is possible to breed tender snap beans without strings, it should be possible to create sugar canes that contain a larger sugar content for a longer time. This may possibly be done by planting such varieties at different dates during the year, so that some plantings will mature in April, others in February, others in March, others in May, others in June and so on in succession, in such a manner as is illustrated in Fig. IV. It is understood that other countries are adopting this scheme.

The major problem here seems to be the financing of this change, but since I do not rate myself as an expert in the technique and economy of the sugar market, nor in agricultural matters, I will leave these fields to those who, like me, are infused with a desire to bring this valuable industry out of the labyrinth in which it is now entrapped.

Before closing, I wish to point out, as a matter that affects the renovation or substitution of varieties, that the method of analyzing cane in order to prorate the participation of the colonos in the sugar produced, is not likely to interest them in planting new varieties in an attempt to obtain a greater yield per acre. At present, account is taken only of the brix and the polarization for determining the yield. Into this determination of the yield there does not enter the quantity of juice in the cane of an individual colono, and the consequence is that the analysis is purely qualitative and not quantitative. A cane may produce a small quantity of juice having a high brix and polarization, and will give the colono the same yield and participation as another colono who produces the same brix and polarization, but less juice. As a consequence the colono sees no necessity or advantage in changing his cane; what interests him is not to supply much sugar per ton of cane but to deliver high brix with high polarization.

In all this, I have perhaps infuriated some, but at least I may have interested others in seeking new ways out for our industry.

The following is added as notes on milling capacity and length of harvest:

1. The curve of total costs is not really a normal variable curve, because some of these costs vary with the length of the harvest, others with the grinding capacity, and others with the quantity of sugar and molasses produced. These are matters to be studied.

2. General fixed costs are assumed to be constant, unless information to the contrary is available.

3. If the percents of profit are calculated to include fixed assets and operating capital then they are reduced by a fraction indicated in the tables.

4. It will be necessary to make a series of secondary studies to make clear the exact relation between the economic characteristics of the industry, and there should be established a pattern of sugar economy which will serve to compare the different centrals and fields with this ideal pattern.

5. Instead of having 30 small centrals or 16 large ones, they be of both types, each type having its approximate share of the harvest.

6. Hawaii has 27 factories with a harvest of 1,000,000 more or less, of sugar which at a 12% yield amounts to about 8,333,333 tons of cane. If grinding continues through 200 days in a year, then the average capacity of a factory is about 1,500 tons per day.

7. The value of the property (land not included) is 71.4 percent of the mechanical condition in the year 1953, cost of new factories in 1959 would be about double. The values of the land would also be about double in 1959.

8. The average capacities of the centrals operating in Puerto Rico in 1950 was about 3,072 tons/day. In 1959 this figure is probably about 3,000 t/d.

9. The size of the crop of a central with a long harvesting season is about:
3,200 T/D × 200 D = 640,000 tons (× 16 = 10,240,000 tons of total crop
1,700 T/D × 200 D = 340,000 tons (× 30 = 10,200,000 tons of total crop.

10. My good friend Pedro Gonzalez Orama has called my attention to the fact that the variable costs of wages change with the price of sugar, but although this is a point of high importance, the comparison of the various sugar economies will not be greatly distorted if this detail is omitted.

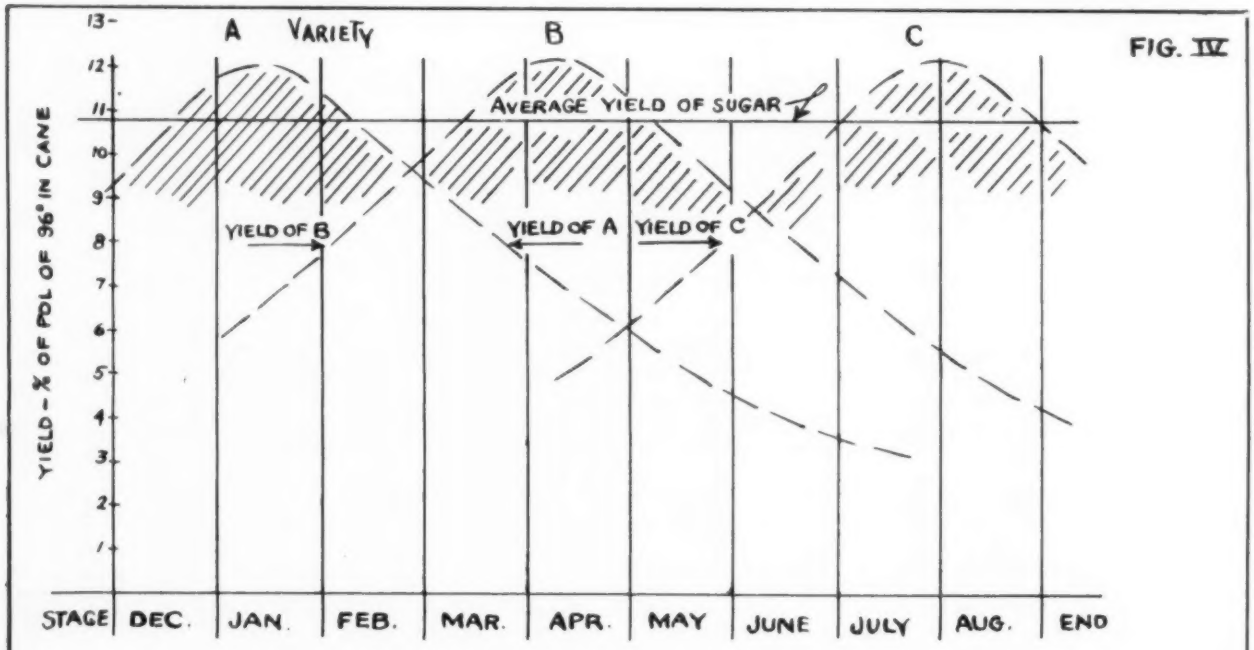

FIG. IV
FORMAT OF LONG HARVEST WITH THE MILLS WORKING MOST OF THE TIME ON CANE OF HIGH SUGAR CONTENT.

ABSTRACTS OF PAPERS

Delivered at Annual Meeting of Puerto Rican Sugar Technologists

Published under the Auspices of the International Society of Sugar Cane Technologists by Special Arrangement with

SUGAR y AZÚCAR—Dr. O. W. Willcox, Editor

Field Group

Current Status of Nutritional Spraying As Revealed By Radioactive Isotopes

By JORGE J. LANDROM, S. H. WITTWER, H. B. TUKEY, F. G. TEUBNER and WM. G. LONG.* *Paper delivered at Dec. 1959 Meeting Asociación de Técnicos Azucareros de Puerto Rico.*

Current progress in the formulation of chemical fertilizers for improved crop production is characterized by greater water solubilities and higher analyses of the mineral elements utilized by plants. Along with the increased availability of all-soluble fertilizers, both as dry and liquid formulations, has come the wider and more frequent use of pest control sprays and dusts. This, in turn, has been accompanied by remarkable engineering advances in equipment for application.

These factors, coupled with the importance of non-root absorption of organic compounds in selective weed control, and the long known effectiveness of sprays of many of the trace elements in correcting nutritional disorders have promoted a renewed interest in the possibilities of applying all essential plant nutrients as sprays, either alone or in combination with pesticides or herbicides to the above ground parts of plants. The practice is currently being termed "foliar" or "leaf feeding", "nutritional spraying" and "non-root nutrition". There is scarcely an area in agriculture of more wide-spread interest, one with more contradictory data, claims and opinions, and where the farmer has moved so far ahead of the scientific investigator.

Use of radioactive and stable isotopes as tracers with the elements commonly applied as fertilizers allows a distinction to be made between what is absorbed by the roots and what is absorbed by the above ground plant parts. In addition, radioisotopes permit tracing the path of nutrients when they are applied to aerial plant parts. They have proved most valuable to an understanding of the use and the value of nutritional sprays.

In studies with nitrogen, phosphorus, potassium and calcium, and other plant nutrients a small quantity of the radioactive or stable isotope is added to the fertilizer. The fertilizer thus becomes "tagged", the isotope being absorbed, distributed and utilized by the plant in the same manner as the normal fertilizer. By such procedures the absorption and utilization of a particular nutrient element by any part of a plant can be accurately followed by radiation counting, X-ray film, or special spectrographic devices. The methods are suitable for studying the absorption of nutrients sprayed on leaves. Many variables, both internal and external, controlling nutrient uptake and crop response can thus be evaluated as well as the relative efficiency and utility of various chemical carriers and fertilizer placement techniques. The following generalized facts have been found pertinent to the absorption of nutrients by the plant leaf.

The leaf as an organ of absorption:—Leaves are usually the most important structures in the absorption of nutrients from sprays. Leaf areas for most plants, particularly many horticultural species, are considerable. Thus, it has been determined that a 12-year-old apple tree provides in its foliage, both upper and lower surfaces, an area of 1/10 of an acre or approximately ten times the spread of the tree. In addition, the leaves of most plants are structurally well equipped to absorb materials through both the upper and lower surfaces. Leaves are not covered with a continuous, impervious waxy coating of cutin.

Influence of age, position, vigor, mechanical injury, etc.:—Leaves of different plants, those on the same plant, and various areas of the same leaf may differ greatly in cuticle thickness and quality, in sorptive properties, and in characters which favor adherence. Both sides of the leaf blade function in absorption, and equally as well, with such diverse crops as the bean, tobacco and grape. While all functional green leaves seem to serve as organs of absorption of materials applied externally as sprays or dusts, young and rapidly expanding leaves are more efficient, per unit area, than leaves which are fully matured.

Influence of stomates, time of day, temperature, humidity, detergents, etc.:—Opening and closing of stomata is apparently of little significance in nutrient absorption by leaves from sprays. The frequency of stomata is seven times as great in the lower epidermis of the bean leaf, yet the upper leaf surface is fully as effective as the lower in phosphate absorption. Foliar applied N^{15} labeled urea uptake at night was three to ten times that during the day in tobacco. There is little difference between day and night in foliar absorption of phosphorus and potassium in beans and tomatoes where humidity and temperature are not variables.

Under controlled conditions, the uptake of phosphorus increases directly with rise in temperature. Some instances have been reported of reductions in uptake at higher temperatures, but this reduction is associated with an accompanying lowering of humidity, quicker drying of applied materials, and reduced solubility of materials deposited on the leaves. Foliage sprays of liquid manure, with water added, have long been used on garden crops in certain European countries. If applied on damp days or immediately after sunset such manuring "tells more promptly". In this connection, leaf absorption of nutrients may be facilitated or impeded by the addition of a wetting agent or detergent to the spray formulation.

Effect of pH and carrier ion:—Entry of nutrients through the leaves following spray application is greatly influenced by the chemical carrier and pH of the solution. Ammonium, potassium, and sodium phosphates are absorbed less effectively by bean, tomato, and apple leaves than ortho-phosphoric acid, or the acid to which only a slight amount of ammonium, sodium or potassium has been added. Invariably, ortho-phosphoric acid (pH

* Prepared under Contract AT(11-1)-159, Biological and Medical Division of the Atomic Energy Commission.

2.0-2.5) has proven superior to any other form of phosphorus for foliar application.

Entry through bark:—Not only do leaves take up nutrients from sprays, but radioactive minerals have been shown to enter even through the bark of fruit trees.

Entry is effected very rapidly if nutrient applications are made in the early spring, just as the buds begin to swell. Trees in this delayed dormant stage may be treated with 10-fold the concentration of nutrients in the spray solution, as compared with that for foliage sprays, without injury. Such treatments have long been practiced in certain European countries.

Entry through developing fruit:—Radioactive minerals may also enter directly through the epidermis of growing fruit, and their presence can be detected later in both the fleshy parts and seeds. This may be of some importance in nutritional spraying, but assumes even greater significance in regard to contamination of food products from atomic fission "fall-out".

Nitrogen, phosphorus and potassium:—Applied as sprays to leaves and other aerial plant parts these nutrients are quickly absorbed and transported to all parts of the plant; to the roots, stems, flowers, fruit, seed and vegetative growing tips. Rate of transport has been estimated at one inch every five minutes. The labeled nutrient may be detected in every plant part within one hour of treatment, and over one-half of that which is applied may be absorbed into the plant within 24 hours. Foliar applied phosphorus accumulates rapidly in growing meristematic regions such as root tips, vegetative growing points, flowers, fruits and seeds, and even embryos within seeds. In pot cultures with various soil types, P^{32} labeled phosphoric acid was applied to the soil in a band in the root area, and absorption compared with sprays to the above-ground parts during early flowering. In fact, up to 95 per cent of the phosphorus applied to tomato foliage may be used by the plant. This represents the most efficient method of fertilizer placement yet devised. The great limiting factor in leaf feeding, which has also been revealed by radioisotopes, is that only part, often a small part, of the total nutrient needs of a plant can be satisfied from sprays. Proper timing is extremely important in nutritional spraying. With many fruit crops, foliar applied nutrients often serve as a more quickly available source for developing fruit than that derived from soil treatments.

Foliar Absorption of C^{14} Urea Nitrogen:—Urea is one of the most useful and well-known nitrogenous fertilizers for leaf application. With some horticultural crops the entire requirement for nitrogen can be satisfied by a few appropriately timed sprays. The apparent relative rates of hydrolysis (utilization) of foliar applied C^{14} urea by a number of vegetable and fruit crops have been determined and plotted against field and greenhouse tests of the tolerance of the foliage of the same crops to urea (sprays) in pounds per 100 gallons of water. From such studies it is possible to predict the tolerances of the leaves of various plant species to concentrations of urea applied as nutrient sprays.

Calcium transport in plants:—In contrast to nitrogen, phosphorus and potassium, foliar applied radiocalcium does not move from the leaves, flowers or fruit which are sprayed. This nutrient moves downward in the plant very little, if at all. Theoretically by foliar feeding leaves could be amply supplied with calcium and the roots starve. Obviously, as revealed by the radioisotope technique, the roots of the runner plants must depend upon their own absorption for a source of calcium. Nevertheless calcium and chemically allied magnesium have been used successfully as foliage sprays on some crops such as celery for the correction of nutritional disorders, whereas soil or root treatments are ineffective. Strontium and barium, also close relatives of calcium, do not move from the leaves of plants.

Not only are nutrients taken up from foliage sprays, but they may be lost therefrom by leaching during rainfall. The loss was greatest from plants grown in darkness at full nutrient level. Thus, nutrients may be lost from above-ground plant parts of plants during periods of rainfall, or in mist propagation of cuttings. These losses may be of sufficient magnitude to alter markedly the behavior of the plant, and should be considered in sampling and analysis of plant foliage for determining nutrient status.

Studies with radioactive and stable isotopes strongly suggest that all nutrients absorbed by plant roots can also be taken up from sprays by the leaves, stems, and fruits. The absorbed nutrients are transported and used in growth just as are those absorbed by roots. A possible exception is calcium which moves very slowly if at all from the leaves to the roots.

Foliar applied nutrients are utilized at a very rapid rate and the efficiency of uptake, especially with phosphorus, may be much higher than from soil treatments. The nutrient absorbing capacities of leaves are great, and good agricultural practice should recognize this function which leaves can serve.

The greatest value of nutritional spraying will likely be realized on crops where certain deficiency disorders can be easily corrected by spray treatments, where spraying is already an established practice, where total leaf areas are large, where conditions are not optimum for nutrient uptake by roots, and when there is a great demand for nutrients such as during flowering and early fruit set. These values are associated with leaf feeding not as a replacement of soil fertilization but with its supplemental or booster effects. With few exceptions, it is feasible even with several applications to supply on a part, often a small part, of the total nutrient needs in crop production by nutritional sprays. The remainder must be absorbed by the roots.

Increased efficiency in leaf absorption of nutrients often results during night in contrast to day, under high humidity and temperature in contrast to low, and by the use of hygroscopic carriers or additives in contrast to those which do not retain moisture. Phosphorus as orthophosphoric acid (pH 2.0-2.5) is most effectively absorbed by leaves.

Most liquid complete fertilizer formulations may be applied as sprays to plant foliage at the rate of one gallon in 100 gallons of water; soluble dry salt formulations at 4 to 6 pounds per 100 gallons. A ten-fold increase in these concentrations is possible if they are applied as delayed dormant sprays to tree fruits. A 1:2:1 ratio is suggested for early transplanted crops and for use on fruit and vegetable crops during flowering and fruit set, while a 1:1:1 ratio is best for promoting good vegetative growth.

■

Weed Control Advances in Puerto Rico

By NOGUERAS, LUCE & CO., P. CARRERAS, CENTRAL MERCEDITA, N. CARDONA, COMUNIDAD AGRICOLA, F. DUPRE, PRIVATE PILOT,
Paper Delivered at Dec. 1959 Meeting Asociación de Técnicos Azucareros de Puerto Rico.

Puerto Rico, as in most sugar areas, started using contact herbicides some twelve years ago. Because this system replaced many workers during the idle season when employment is slack, it was met with great resistance. Also with the stronger arsenic sprays first used, accidents did occur that were without full justification, blamed on this system. With the use of less toxic materials the latter obstacle was removed, but the first still persisted. With the greater migration of labor the supply of field hands decreased which helped in the general acceptance of the use of chemical herbicides.

Once the use of contact herbicides was accepted, hand application of pre-emergence spray was started. In this case application of 2-4D caused trouble with farmers who grew crops susceptible to damage by this material. With new spraying materials that can be more readily controlled, most of this difficulty has been eliminated. With less labor each

year airplane application was adapted to keep up with proper timing that is essential to a good herbicide program. There are three air spraying companies now established in Puerto Rico and they are continually expanding.

The government has set up a unique system of damage claims by complainants. This is covered in one of the papers by one of the local pilots.

■

Tractor and General Equipment Maintenance as Practiced by Luce and Co.

By W. NELTHROP and P. H. GRAY, *Paper Delivered at Dec. 1959 Meeting Asociación de Técnicos de Puerto Rico.*

The system of maintaining and developing machinery on the plantation of Luce and Company is described in three parts:

(1) The object in the first instance is mainly to provide care and maintenance of these machines, in such manner which will give little or as to give no occasion for breakdown; this step also includes training and placement of operating personnel.

(2) The second phase falls under the category of repairs. This covers transportation, receiving, cleaning, dismantling, analyzing, assembling, testing and returning to service from the central shop.

(3) The third phase deals briefly with the study, development and testing of new types of field machinery and adaptation to particular needs.

■

Experiments on Spraying Herbicides by Airplane

(Report from LUCE & CO., Central Mercidito; FRANK DUPRE, Private Pilot), *Paper delivered at Dec. 1959 Meeting Asociación de Técnicos Azucareros de Puerto Rico.*

In 1954, due to scarcity of labor, spraying herbicides by airplane was adopted, with good results as regards killing the weeds and reducing costs. Therefore we are continuing this kind of work. This success is ascribed to the experience and responsibility of the pilots, the choice of the sites to be sprayed, the use of suitable concentrations, rapid execution of the work. All these favor control of weeds. The method is to be recommended, provided proper precautions are used.

■

Time and Motion Studies Applied to Weed Control by Herbicides

By EXIO MEJIA, *Paper delivered at Dec. 1959 Meeting Asociación de Técnicos Azucareros de Puerto Rico.*

One of the most important operations in the cultivation of cane is the control of weeds with chemicals. However, there is difficulty in obtaining personnel qualified for this type of work. Recourse has therefore been had to aerial application of these products as at least a partial solution of the labor problem. But on the other hand this project has certain limits because contact herbicides can not be spread by airplane and this method can be used only for pre-germination application of insecticides and herbicides. Also, the cost of the product rises from year to year, and it is necessary to have a good control of its use in order to avoid unnecessary expense.

Time and movement studies were made for the purpose of developing an incentive plan that would increase the income of the worker and increase his interest in this kind of work, and at the same time partly ease the shortage of labor. Out of these studies it has been possible to design a good system for controlling the product and lowering the cost of application.

Among the important factors to be considered in these studies are: the heighth of the cane, the percentage of land covered by weeds, the type of weed and the topography. As in all other time and movement studies, consideration has to be given to the physical fatigue endured during the work.

The equipment used for protecting the worker, and to carry out properly the operation, should be of the best quality and kept in workable condition.

The "standards" were developed on the basis of minutes required for distribution of one gallon of the sprayed solution. In this system the quantity of solution spread by each man is measured, at the end of the workday, note is taken of gallons spread by the worker. Applying these standards for each gallon sprayed under the different conditions of the job, the amount of incentive to be paid to each worker is calculated. These incentive payments are paid over and above a minimum wage that is guaranteed to each man.

By adding up the total number of gallons sprayed by the group, and knowing the acreage covered during the day, the amount of liquid sprayed per acre can be figured out. This gallonage per acre should agree with the estimated gallonage required for killing the weeds on a particular field.

■

The Use of Stubble Shavers in Puerto Rico

Panel: T. SUAREZ, D. SERRANO, and N. CARDONA, *Paper Delivered at Dec. 1959 Meeting Asociación de Técnicos Azucareros de Puerto Rico.*

Luce and Company on the South Coast went into stubble shaving five years ago to assist in preparing ratoons for faster irrigation. The type of stubble shaving was with the solid non-rotating blade. Though the machine does a good job, cost of maintaining blades to the sharpness required is costly. Faster and better ratooning has been experienced where this operation is carried out. Where the blades have been allowed to get dull, more replanting is needed. Mechanical stubble shavers have been tried but the amount of power needed to operate these blades makes them impractical.

Areas that have gone into the Modified Louisiana System have adapted the standard Louisiana type stubble shaver. In most cases they have had to be reinforced to take care of the rougher service encountered in Puerto Rico. Good results have been obtained in fields already done and it is planned to expand this operation throughout the area planted to this modified system.

■

Service to Growers at Plata

By GUILLERMO ESTEVES, JR., *Paper delivered at Dec. 1959 Meeting Asociación de Técnicos Azucareros de Puerto Rico.*

The decline in cane yield per acre in the San Sebastián area, brought about indirectly by the establishment of the quota system in Puerto Rico, made it evident that a program to increase yields must be initiated. Since the large majority of the growers could not undertake the renewal of their plantations, a Service to Growers Division was created in November of 1955 to provide the necessary facilities.

Although the Service to Growers is operated as a division of the Agricultural Department, it has its own personnel and equipment. Services currently being offered are: 1) Custom land preparation for new plantings. 2) Variety trials and the recommendations of new cane varieties. 3) The supply of clean

(Continued on page 60)

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Annual Meeting Sugar Technologists Association of Puerto Rico—1959

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seed of commercial varieties at low cost. 4) Technical advice on the use of fertilizers and agricultural chemicals, and the supply of these materials at low cost. 5) The improvement of established field practices. 6) The development and introduction of new practices that can be adapted to local conditions. 7) Long term crop loans for new plantings at low interest rates, in conjunction with the financing of the current ratoon crop.

■

Mill Group

Progress Through Research

By ARTURO RIOLLANO, *Paper delivered at Dec. 1959 Meeting Asociación Técnicos Azucareros de Puerto Rico.*

Investigations of several phases of sugarcane cultivation and industrialization are being carried out at the Agricultural Experiment Station of the University of Puerto Rico. These investigations follow the development of a series of projects that cover, among others, the following lines of research: breeding new sugarcane varieties; mechanization of harvesting and loading; determination of fertilizing procedures; foliar diagnosis; use of radioactive phosphorus; irrigation and trash disposal; determination of factors affecting sucrose content; studies on chlorotic streak and the stunting disease; control of insects and nematodes; production and refining of sugar through ion exchange process. In addition, several studies are being made on the use of such by-products as filter press cake and molasses. The rum studies include fermentation and distillation as well as the establishment of standards of quality.

■

Automatic Cane Feed at Igualdad

By EMILIO MORALES, *Paper Delivered at Dec. 1959 Meeting Asociación de Técnicos Azucareros de Puerto Rico.*

After two seasons of operations with the automatic feed equipment of the Central Igualdad Factory better work and 15% more milling capacity has been the result.

The system, which combines hydraulics and electromatic apparatuses, regulates feed to the knife sets, crushers, and mills. A floating feed roll regulates feed to the crushers by regulating the speed of the carrier. Should the knives be overloaded this situation is signaled to the control panel which slows down the whole mill train. If a choke occurs, each mill is stopped as it runs out of material. Should the mill be stopped because of no cane, each station closes down as it lacks material.

The paper will cover all experiences leading to the development of this unit.

■

Improved Construction of Blades of the Revolving Cane Knives

By J. A. LOMBA, *Paper Delivered at Dec. 1959 Meeting Asociación de Técnicos Azucareros de Puerto Rico.*

Because of the great amount of foreign matter, such as rocks, cane roots, tramp iron, etc., delivered to the mill mixed with the cane, it was necessary to construct the blades of the revolving knives of a material that will resist impact from this foreign matter when passing through the knives and at the same time be wear resistant.

First, special alloy steels were used. Blades made of alloy steels proved to be wear resistant, but did not stand up well under the impact caused by rocks, etc.

Cutting blades then were made of ordinary mild steel using a hard facing welding rod on the cutting edge.

This construction proved to be very satisfactory for impact and wear, but imposed a higher load on the drive motor.

The redesigning of the machete type blade, making the tip of the blade square, reduced considerably the cost of the blade and reduced the power requirements of the drive motor.

This type of blade was used in the machete type of knives and in the small pitch knives at Central San Vicente during the crops of 1957 and 1958 with very good results.

A change in the material used in the bolts holding the blades to the hub was also necessary to obtain the best results with this type of blade, as they proved to be the weak point.

A great saving was made both in the construction of the blades and in the operation during the crop of the revolving knives by using this type of blade. The cost of the machete type blade was cut to about half, and that of the small pitch knife to about one-third. No sharpening of the blades was necessary during the crop and only the blades that were bent were changed during Sunday shut downs. Also during this inspection weak bolts were changed.

■

Separan Experiments at Guanica

By ROBERTO RAMIREZ, *Paper Delivered at Dec. 1959 Meeting Asociación de Técnicos Azucareros de Puerto Rico.*

Experiments were tried at Guanica using Separan A-30 and Bentonite to improve juice clarification. Inconclusive tests, show that Separan seemed to give better mud sedimentation and lower mud volumes.

It was found that the quantity of either Separan or Bentonite to be added was critical and for best results needed to be carefully controlled.

■

Cane Washing at Cortada

By CENTRAL CORTADA STAFF, *Paper delivered at Dec. 1959 Meeting Asociación de Técnicas Azucareros de Puerto Rico.*

Central Cortada was the first mill in Puerto Rico to receive mechanically harvested cane. During the crop of 1953 it received approximately 50% mechanically loaded cane and about 50% hand loaded cane. Immediately troubles were encountered in both the mills and boiling house. Being the first year a lot of stones and tramp iron were brought into the mill. The results were nearly fatal.

For the following crop water was added to the feeder table which helped tremendously in reducing the amount of dirt going into the mill. A grate floor was also incorporated in the table to help carry away the foreign material and water.

For the '55 crop more water was added to the table and a better system of carrying away the material was installed under the table. A larger settling reservoir was made to receive the discarded fresh water.

The 1956 crop found better levelers being added to the table with extra sprays added pointing directly into the levelers. Because of short chain life a bigger and better type of chain was added to the table. Also more chains were added.

During the '57 crop the back part of the table was lowered to facilitate the leveling of cane. This helped, but the table still lacked equipment to remove the ever increasing amount of trash coming in with the cane. Extensive studies were carried out during the '58 crop to determine the amount of trash coming in and the best system of removing it.

For the '58 crop the table was completely rebuilt. A tumbling action and trash rolls were added to the table. This operated successfully during the '59 season. Some improvements are being made to the table now, but it will be essentially the same table for the 1960 crop.

A similar unit is being added to Central Machete for the coming grinding season.

■

Elguanite Process at Aguirre

By MIGUEL BALLASTER, *Paper delivered at Dec. 1959 Meeting Asociación de Técnicos Azucareros de Puerto Rico.*

During 1959 crop the new Elguanite Selective Juice Clarification Process was tested at Central Cortada, Santa Isabel, P. R. We have been able to duplicate the results already obtained at Central Machete during 1958 crop. (See SUGAR y AZUCAR, Vol. 54, No. 7, July 1959, pg. 17.) The following facts were observed at Central Cortada:

1) Less Elguanite is needed to obtain the same results when processing clean juices.

2) Though Elguanite is not used as a clarifying agent it has shown benefits in this station when juices contain fine particles of dirt in suspension.

3) The flocculating action of Separan AP-30 is accelerated when used in combination with juices treated with Elguanite rather than lime.

4) With the Elguanite process the purity of the final molasses dropped six points.

5) Elguanite treated juices produce molasses that facilitate seeding and sugar boiling.

6) Because of the use of Elguanite as a preservative the complete liquidation of juices in process during periods of bad weather was reduced from average of four per year to none. Juices were held up to 58 hours with practically no losses due to inversion.

■

Offer for C & D Shares

W. J. McGregor, president of Canada & Dominion Sugar Company, has announced that shareholders will receive late in October a formal offer from Tate & Lyle Ltd. of London, world's largest sugar refiners, through Triarch Corp. Ltd. of Toronto, Canada. The offer to purchase at $25 Canadian per share 50% of the outstanding shares of C & D not already held by Tate & Lyle leaves a substantial participation in the hands of existing shareholders. The offer will be open until November 12th and will be subject to a minimum tender of 593,370 shares. Individual shareholders will have the option of offering more than 50% of their shares but it will depend on the total number tendered what proportion of such additional offerings are accepted. The offer discloses that the number of shares held by the Tate & Lyle Group amounts to 197,130. C & D directors intend to recommend acceptance of the offer by shareholders. Triarch Corp. has as shareholders London and New York banks and prominent Canadian individuals.

■

"Castro Gets The Bill"

The staggering financial burden imposed by the agrarian reform, which Dr. Castro of Cuba states is the basis of his revolution of July 26th, is analyzed in the October 29th issue of "The Reporter" published in New York under the title "Castro Gets The Bill". The article, by R. Hart Phillips, points out that the administrative cane lands of U.S. and Cuban sugar mills will not be expropriated until after the 1960 crop; nevertheless, North American owners are scheduled to lose 1.6 million acres and the Cuban owners approximately eight million acres with possibly inadequate compensation. When the Agrarian Reform Institute, headed by Dr. Castro and managed by Dr. Antonio Núñez Jiménez, undertakes to reapportion these lands and arrange payments to the workers in excess of the wages previously paid by the landowners, the costs will soar into the millions weekly. The article in "The Reporter" points out that a considerable carryover from the 1959 crop added to a surplus in 1960 may make it necessary for the Cuban government to finance the retention of a large percentage of the surplus adding to the cost of operating the sugar industry that may devolve on the government. Cane planters have asked the government to take over mills that have not liquidated their debts to the planters. As the government complies with these requests, more mill financing will be necessary. The question raised by this article is:

"How will Castro obtain the funds necessary for his agrarian reform and for the industrialization which he reiterates is a 'must'?"

Since it is not the intention of the Cuban Government to seek financial assistance from outside sources, Dr. Castro proposes to raise the necessary money from the Cuban people through the sale of industrialization bonds but, says Mr. Phillips, these securities have met with a very cool reception.

■

60 New Centrifugals to Taiwan

An order for 60 centrifugals and accessories has been placed by the Taiwan Sugar Corporation with Thomas Broadbent & Sons Ltd. of England. Value of the order is said to exceed £300,000 ($840,000). Mr. W. Hallitt, vice-chairman of Broadbents, who spent considerable time in Taiwan, said: "I was very impressed by the degree of technical skill and knowledge that the Taiwan sugar engineers possessed on sugar production, mechanical engineering and electrical engineering."

■

Papers for ASSBT General Meeting

Ralph Wood, program chairman of the 11th General Meeting of the American Society of Sugar Beet Technologists, states that 150 papers have been promised. This year the meeting will continue for four days, Tuesday through Friday, February 2-5, 1960 at the Hotel Utah in Salt Lake City, Utah.

■

Sugar Industry Technicians Plan For 1960

The Nineteenth Annual Meeting of the Sugar Industry Technicians will be held in New York on May 8th through the 10th, 1960. As in the case of the 18th Annual Meeting, the first day, Sunday, May 8th, will be devoted to meetings of the Board of Directors and of various committees. Technical sessions will be held on Monday the 9th with the banquet that evening. Further technical sessions will be held on the 10th ending up with a symposium that afternoon. The program will follow the format established at the 18th Annual Meeting (SUGAR y AZUCAR, May 1959, pages 64-65) and further details will be published in subsequent issues as they become available. E. J. Culp, Technical Director of American Sugar Refining Company, is president and E. W. Harris is executive secretary of S.I.T.C. whose headquarters are located at 150 Nassau Street, New York 38, N.Y.

Sugar's Progress in

HUMAN RELATIONS

Roy J. Leftingwell

Nobody Wins A Strike

The losses suffered as a result of a strike—by companies, by strikers, by consumers and by the country as a whole—are obvious to nearly everyone. The assumption must be that someone "wins", yet a careful analysis of several major strikes makes it appear doubtful that this is true.

Unfortunately, a profit and loss sheet showing what the facts are is seldom drawn up. Therefore, it was interesting to see such a tally prepared by Henry Hazlitt of "Newsweek" magazine on the steelworkers' strike in the United States.

The final demand of the union was for a wage increase of about 15 cents per hour. According to official statistics, workers were already being paid $3.10 a hour. The additional 15 cents amounted to about $6 per week.

This means that it would take more than 20 weeks of work, at the increased wage, to make up the loss for each week of the strike. When the strike passed the first two and a half weeks, the workers had already lost more than they could make up by a full year's work, if they won a complete victory. And, as the companies' proposal was for a one year wage freeze, this means that the strikers were worse off after 2½ weeks than if their leaders had accepted the companies' offer.

A tally of previous steel strikes show that the workers lost heavily on net balance from every prolonged walkout, although they "won". In the strike of 1956 each worker lost about $600 in wages as a result of six weeks' idleness. Even at the end of the three-year contract which terminated the strike, and the increased wages granted, the average worker made up only $190—leaving him about $400 worse off than if he had not struck.

In 1952, the strike was over the issue of "union shop", or an attempt to require union membership to hold a job. During seven weeks of idleness workers lost $595 each. Even after deducting one month additional retroactive pay, which was granted by the companies, and an average of two weeks vacation pay collected by some employes for the strike period, there remained a $395 loss.

In the 1949 strike, the loss per employe was $454.93. As there was no wage increase won, the loss was never made up.

In the 1946 strike, the loss was $219.67 per employe. Additional earnings won for a full year was $72.80. The strikers were still about $146 worse off than if they had not struck.

There is no more dramatic example of loss than in the four-month strike of sugar plantation workers in Hawaii in 1958. Losses to the companies are still staggering and the workers never will make up their losses.

It is fairly conclusive that nobody wins a strike, but there are other facets that so many people fail to understand. On the surface, strikes are based upon demands for money, but generally this is not the real cause. Maybe, the union leader has a personal grudge to settle—and positive examples of this can be cited in the sugar industry. Or, it may be that workers force their union leaders into a strike because of an issue which the rank and file group feel is an injustice.

Nobody wins a strike, but money is seldom the real cause. If it were, there would be fewer strikes. Start looking for the "real" reasons behind labor discontent and it will be easier to find solutions to such problems.

The sugar industry, world-wide, is moving toward the use of more machines and fewer people. Therefore, we must watch developments in labor contract settlements involving similar operations in other industries with interest.

One of the recent settlements in the area of automation came in a contract agreement between the International Longshoremen's and Warehousemen's Union (ILWU) and the Pacific Maritime Association on a new three-year contract for longshore work on West Coast docks.

The basic problem was how to compensate employes who lost their jobs as a result of technological developments. In this case it was the large container program in which merchandise is loaded into large containers and handled with mechanical equipment on and off shipboard, thereby reducing use of longshore gangs.

The solution in negotiation sessions was similar to a formula adopted by other unions. A calculation is made to determine how much work one man could handle in an hour under the old method. A calculation is then made to determine how much work a man can turn out by the new method with new equipment.

For each hour saved by mechanization, the employer contributes an hour's straight time pay into a fund for a year. At the end of the year, the money in the fund is distributed as severance to employes replaced by machines.

Such a formula may provide a solution to many of the problems that will beset the sugar industry during the current mechanization program.

A month's strike of 10,000 Colombian sugar workers ended recently when employers agreed to give 94 dismissed union members 11 months of severance pay.

Four college engineering scholarships, valued at $13,000, have been awarded to four residents of Hawaii by the Hawaiian Sugar Planters' Association. The scholarships are worth $1,000 a year until graduation. Sixteen applications were received for the four scholarships.

An agreement has been reached between the National Sugar Refining Co. and the United Packinghouse Workers providing for telephones to be installed in the women's dressing rooms, so that mothers can keep in touch with their youngsters at home.

How can a company spark the enthusiasm of middle and lower management and give line employes a real feeling of participation in company affairs? The Worthington Corp. of Harrison, N. J. has attacked this age-old problem with effective, up-to-the-minute communication techniques.

Through a special closed-circuit telephone hook-up and tape recordings, Worthington's recent annual stockholders' meeting was brought to employes in 52 offices and plants in the United States, Europe, South America and Japan.

More than 2,000 foremen, salesmen, researchers, and plant managers, who could not be pulled out of their work locations even to attend regional meetings, heard addresses by the company's two top executives without having to leave their posts.

Direct broadcasts were brought in by leased telephone lines to 16 plants. Tape recordings of the same speeches were prepared in advance so that employes in 24 smaller sales offices and 12 foreign plants could hold their meetings simultaneously.

After listening to the proceeding of the New Jersey meeting, each local office held its own "annual meeting" at which plans for the specific area were discussed. The local management groups, in turn, relayed the information to the other 13,000 Worthington's employes.

facts about sugar

NEW YORK, OCTOBER 5: The U. S. Department of Agriculture on September 28 announced that raw sugar in excess of 1959 quotas may be imported after October 1, 1959, for refining and storage until January 1, 1960. B. W. Dyer & Company, Sugar Economists & Brokers, point out that in 1958 similar action became effective on October 22, and 119,000 tons of overquota were received.

Permission to bring in overquota sugar was prompted by record breaking distribution and by the rise in raw sugar prices, which advanced to $6.05 per 100 pounds on September 24. After the overquota action, the spot price declined to $6.00.

The scheduled advance of refined sugar prices in the Chicago-West territory was first postponed and then rescinded. The prevailing basis price of $8.80 outside the delivered price zone, and $9.20 within it, was continued, as well as the 10¢ direct shipment allowance where applicable. In the East, the $.20 advance on bulk dry and liquid sugar was postponed until the close of business October 9th, but the advance on bagged sugar became effective October 1st.

The International Longshoremen's Association went on strike October 1st, despite an agreement to extend the old contract for 15 days from the September expiration date. Although the North Atlantic group agreed to the extension, it was reported that the Gulf Coast locals had turned it down because they were not offered retroactive benefits. President Eisenhower subsequently halted the strike for an 80 day cooling off period by using the emergency provisions of the Taft-Hartley Act.

Robert H. Shields, President and General Council of the U. S. Beet Sugar Association, on September 12th estimated that the record sugar beet crop should yield about 44 million 100-lb. bags of refined sugar (this would be equivalent to about 2,354,000 short tons, raw value, compared with the U. S. Department of Agriculture figure of 2,202,000 tons for 1958). Mr. Shields was quoted as follows, ". . . This year's record sugar beet crop again demonstrates the dependability of U. S. beet sugar production. . . . Dependable mainland produced sugar supplies are especially important to American consumers when doubts are being raised about future production in some offshore supplying areas."

Domestic sugar producers at the end of September were reported to be holding meetings to seek increased quotas under the new Sugar Act, which becomes effective January 1, 1961. Spokesmen say there is no desire to harm Cuba's position as the major foreign supplier of the United States market, but there seems to be considerable sentiment in Congress to reduce Cuba's quota because of uncertainty over economic policies of the Havana Government.

Sugar Prices October 5, 1959

Ex Duty Raw Sugar N.Y.	**6.00**
Average #6 Raw Sugar Jan. 1 to Oct. 5.	**5.69**
Refined Sugar Gross N.Y.	**9.55**
#4 Raw Sugar (f.o.b.) Cuba	**3.15**
Average #4 Sugar Jan. 1 to Oct. 5	**2.95**

Future Prices	*Contract #6*	*Contract #4*
November 1959	**5.99**	—
January 1960	**5.68**	**3.20**
March 1960	**5.55**	**3.20**
May 1960	**5.63**	**3.21**

Public hearings on 1960 sugar requirements (quota) will be held November 24 in Washington, D. C.

World (#4) spot raw sugar prices advanced from 2.95¢ per pound at the beginning of September to 3.17¢ on October 2nd. The advance was helped by the Russian purchase of 330,000 tons of raw from the Cuban Sugar Institute at 2.905¢. This transaction called for the shipment of 100,000 tons this year and 230,000 tons in the first quarter of 1960.

In addition to this, F. O. Licht on October 2nd issued the first estimate of 1959/60 beet sugar production, which placed Western Europe at about 8,357,000 short tons, versus 9,604,000 tons last season. Eastern Europe was estimated at about 10,378,000 short tons against 10,978,000 tons in 1958/59. West Germany, France and Russia showed the biggest declines.

The International Sugar Council announced that 269,950 metric tons of sugar have been surrendered from export quotas as follows: Indonesia 100,000 tons; Haiti 42,196; Portugal 9,000; Soviet Union 100,000 and France 18,754. This has been prorated to other countries with Cuba getting an additional 120,392 tons.

Cuban sales to the world market (outside U.S.) through Sept. 30 were 2,173,398 short tons, including the 100,000 ton sale to Russia, according to a survey by Willett & Gray, Inc. compared with 2,659,009 short tons to that date last year.

In view of increased sales, B. W. Dyer & Company now estimates that the Cuban carryover at the end of 1959 will be about 1,500,000 short tons.

Puerto Rican Technologists Field Day

SAN JUAN, OCTOBER 1: Members of the Association of Sugar Technologists went on an excursion September 25 to the Isabela Agricultural Experiment Station and the Aguadilla Shipping Terminal. At the Isabela Station the visitors inspected the experimental plots of new cane varieties. They examined the production program for distribution of seed cane of the best new varieties, the experiments on levelling and conditioning of land for irrigation, and the commercial plantings in the region. At the Aguadilla Shipping Station they reviewed the handling of sugar in bulk from the sugar Centrals in the northeast section of the Island. They also saw the wharf facilities for sugar loading and installations for weighing and sampling the sugar. The excursion wound up with a breakfast with the directors of the Central Colon.

A meeting of agricultural machinery distributors was convoked by Luis Rivera Santos, Secretary of Agriculture and Commerce. The object of the meeting was to consider what help might be given to the movement toward the mechanization of agricultural operations in the sugar industry. Attending the meeting were representatives of Porto Rico Iron Works, General

Equipment Corp., Gárcia Commercial, Clemente Santisteban Inc. and San Miguel & Cia. The Secretary reviewed the present situation stressing the urgent necessity for a rapid development of technology, and especially in relation to mechanization. He pointed out the lag in the Island's technological development in comparison with what has been accomplished in other sugar-producing areas. The Secretary reaffirmed that the cane growers are able to pay for the needed equipment and machinery for their agricultural operations, but they need at least a minimum of five years credit. The machinery distributors offered their co-operation with the government to promote mechanization, and raise annual sugar production to the 1,300,000 ton level.

Hawaiian Sugar Shares Rising

HONOLULU, SEPT. 30: The business boom in Hawaii, which has resulted from granting of statehood to the Islands, has brought new interest to sugar company stocks. However, sugar in the cane is not the cause of this interest. The vast fee simple land holdings of many plantation companies is attracting many new investors.

Several plantations are directly getting into the sale or lease of land suitable for sub-division sites. One example is Oahu Sugar Co., located nearer to the booming city of Honolulu than any other plantation. Recently they announced a subdivision of 12,000 homes on part of their leased land. This may bring the company as much as $17,000,000 in profits. As a result of the announcement of development plans, Oahu's stock jumped from $18 to $24 per share in one week.

The four-month sugar strike on Hawaii's plantations last year is still reducing the output of sugar. It may also be having some effect upon the labor relations organization in the Islands. Dwight C. Steele, who headed the Hawaii Employers' Council for several years, retired suddenly this fall. The reason given was ill health. However, it is said in sections of the industry that there was dissatisfaction by some companies in the counsel given by Mr. Steele during the sugar strike. This was promptly denied by other industry officials. Regardless of the cause, it appears that Hawaii's central management labor relations organization, which has been in operation for 16 years, is in for some major changes. More companies are adding staff members capable of taking over their own labor negotiations, which the council has long handled.

A new seed cane planter has been developed by the Hawaiian Commercial & Sugar Co. at Puunene, Maui, that performs three operations at a time. It furrows, plants and fertilizes the seed cane with aqua ammonia. On either side of the planter are two, 140 gallon tanks, which carry the ammonia. At the lowest fertilization rate the tanks will supply four acres. At the highest rate, enough ammonia is available to fertilize two acres.

Upgrading of sugar workers in Hawaii, as a result of increased mechanization, is apparent. Ten years ago more than three out of every four workers were in work grade 3 (the classification system runs from grade 1 to 10). Today, nearly half of all hourly workers are in grade 4, or higher. The percentage of workers in the highest grades (7 through 10) has more than doubled in the last decade.

The Hawaiian Sugar Technologists are holding their first meeting in two years on October 16 to 19. Last year the meeting was called off because of the sugar strike which closed all plantations in the spring. The mills, which lost four months of operation, generally ground through the year end.

Hilo Sugar Co. has purchased a new $42,000 Thew Loraine Model L-50K cane loader with a GMC series 71 diesel engine and a 40 ft. boom with 6,000 lbs. of lift capacity. It is equipped with a Kohler operated power plant to produce electricity for night illumination. The turntable lock, travel clutch, steering, and pawl lock are air controlled. One of the significant safety features is that if the travel clutch should disengage, the pawl lock will automatically lock to prevent the machine from traveling.

Hawaiian Agricultural Co., located on the Island of Hawaii, has a new three-line seed planter—which is reported to be more efficient than either a two or four-line machine.

The $41,000 unit has four bins designed to hold two tons of bulk seed cane each. It also carries three, 700-pound fertilizer bins.

Other novel features include widening tracks of the vehicle to 86 inches, with 30-inch-wide track pads. All lubrication points are color coded.

Hawaiian Commercial & Sugar Co. has developed a new lightweight tractor to push cane away from irrigation lines. Heretofore, this has been a hand operation and due to the hard work involved it has been difficult to get men to do the job. Some follow-up by hand will still be necessary, but the two new tractors which will soon be in operation are expected to do most of the heavy work.

Distinguishing features of this HC&S design are the long tracks and fixed corrugated belt in front. The rig can travel along the roadsides and flumes, above and below level ditches. It picks the cane up on the right and the belt pushes it to the left into the standing cane. Being lightweight, the machine can travel on top of the pushed cane with minimum damage.

HC&S is also in the news with renewal of their experimental work to pump finely chopped cane from the harvest field to the mill in a water-filled pipe. C. Jay Rockstead, the company's chief development engineer, says that 10% of the sugar raised by HC&S is lost because of existing harvesting, hauling and cleaning methods. This loss amounts to some $2.5 million each year.

Mr. Rockstead has long been active in improving the mechanization of field operations. He says that in Hawaii it takes 2.3 man-hours of field work to produce 100 pounds of sugar. By contrast, beet sugar producers on the U. S. mainland produce 100 pounds of sugar with one man-hour of field work.

An eight-inch test line has been installed from one of the company's harvest fields to the Paia mill of HC&S, a distance of one mile. If this experiment works, Mr. Rockstead says the company will install a total of 28 miles of pipelines to service their fields. These pipes would probably be of 14-inch diameter.

This research project has been underway for several years. Dfficulties have been experienced in securing a machine to harvest, then chop the cane in pieces small enough for pipe transport.

Hakalau Sugar Co., located on the Island of Hawaii, has a program underway to build an additional 143 miles of plantation roads. The total road program is expected to cost $2,000,000, including 43 miles now completed.

The proposed routes are laid out over a photo-contour map to determine the best location for minimum grade and adaptability to field operations. Other important considerations in initial planning are the total length of road, the number and sizes of culverts and gulch crossings.

New road construction is done under contract, to company specifications. However, road maintenance is by plantation crews.

Engineers of the Experiment Station, Hawaiian Sugar Planters' Assn. are making modifications to their experimental seed cane harvester. The design which is believed to be the first mechanical seed cutter ever developed, is being revamped to provide a two-ton capacity storage-conveyor.

The machine will cut and transport seed cane, then discharge the seed pieces into a truck. Two cutter-loads fill one truck. This is expected to reduce waiting time for trucks.

The present machine is the second model to be designed. Its operation has been so successful that plantations will likely start

fabrication of their own units. These machines would replace the last of the hand cutters in the Hawaiian industry. All commercial cane is now mechanically harvested, but seed cane is still cut by hand.

Record U.S. Beet Crop

WASHINGTON, D. C., SEPTEMBER 30:—The record sugar beet crop in prospect should yield about 44 million 100-pound bags of refined sugar, a new all-time high, Robert H. Shields, President and General Counsel of the United States Beet Sugar Association, said today.

Government crop experts earlier this week forecast an all-time high sugar beet harvest of 16,305,000 tons, five percent more than the previous record harvest in 1957.

The Department of Agriculture also estimated per-acre yields of sugar beets at a record 18 tons. The previous record, set in 1957, was 17.7 tons of beets per acre.

In most of the 22 sugar beet producing states, the harvest will start in late September or early October. The California harvest is well under way.

Shields pointed out that "new crop" sugar thus will be available in quantity within two or three weeks to supplement present supplies in filling the recently increased U. S. beet sugar marketing quota.

It has been announced that Holly Sugar Corporation has sold its plant and property at Swink, Colorado. This was a 2,400 ton per day beet factory erected in 1906. Swink did not operate during the last crop. Holly also sold the Garden City, Kansas, factory and land that the Corporation had acquired in 1955 and closed down in 1957. Garden City was a 1,200 tons per day factory built in 1906. The purchasers are Martin Smith and T. C. McMillan who will dismantle and dispose of the machinery and properties valued at over $1,000,000.

Louisiana Output Estimated at 510,000

NEW ORLEANS, OCTOBER 2: The Louisiana sugarcane farmers have enjoyed a month of favorable weather for planting operations and at this writing the job of getting the 1960-61 plant cane crop in the ground is almost completed. The 1959-60 grinding campaign is scheduled to get under way in the very near future with the first mills beginning operation during the week of October 5th. The earliest starting date that we have received is October 7th.

Lloyd L. Lauden, Agronomist of the American Sugar Cane League, has reported his observation regarding crop prospects in the October 1st issue of the League's official publication, "The Sugar Bulletin," and we quote below from this report.

"As the harvest draws near there are stronger indications that this crop will be a good one both from the standpoint of cane per acre as well as pounds of sugar per ton of cane.

"This writer estimates that Louisiana mills will grind about 5,700,000 net tons of cane from approximately 248,000 acres, for an average of about 23 tons of net cane per acre. Last year Louisiana mills ground 4,868,908 tons of net cane and produced an average of 22.2 net tons of cane per acre from 219,144 acres.

"This crop has a good chance of producing as much sugar per ton of cane as the 1958 crop produced. It is estimated that this crop will produce about 510,000 tons of sugar raw value, give or take 5,000 tons. Last year Louisiana produced 443,000 tons of sugar, raw value."

The thirty-seventh annual meeting of the American Sugar Cane League was held in New Orleans on September 24th and Warren-Harang, Jr., a cane grower who lives in Thibodaux, Louisiana, was elected President to succeed Bronier Thibaut, of Napoleonville, La. Mr. Harang is the twentieth President of the American Sugar Cane League.

Large Crop Threatens Surplus in Mexico

MEXICO CITY, SEPTEMBER 28: Both the National Union of Sugar Producers and the Union of Mexican Sugar Industry Workers concur on fact that production in the 1958-59 cycle will total 1,270,000 tons, as compared with 1,018,041 tons in the 1956-57 cycle.

While actual production has not hit the top figure, still the National Union of Sugar Producers estimates that Mexico will have a 400,000 ton surplus by the end of the year.

On the matter of surpluses, however, there is not the same accord in sugar circles. Whereas the Union estimate stands at 400,000 tons, the Workers Union states that this will only be 270,000 tons, basing its figure on an estimated internal consumption of 990,000 tons.

Producers, through their organization, however, forecast increasing surpluses and are worried by the developing trend where world overproduction of sugar may cause serious repercussions.

Union officials, also worried about consequences of excessive surpluses, agree that a fight must be made to increase internal consumption from the present low figure of 56 lbs. *per capita*. A new drive is to be initiated, in cooperation with the producer's union which has announced that it will increase its sales agencies, now totaling 316, to 500.

If there is no marked success in boosting consumption in the home market a cutback in production may be considered, no matter how distasteful this may be both to producers and the administration.

Brazilian Government To Store Excess Output

RIO DE JANEIRO, SEPTEMBER 28: The 1958-59 season closed throughout Brazil on May 31. Comparing the last two seasons, production increased by 21.1% in 1958-59, to 3,545,596 short tons, an all-time high, consumption by 14.1%, to 2,522,916; exports by 12.7%, to 834,331, and stocks on hand at May 31st, 1959, by 47.0%, to 586,893 tons.

Officials of the Sugar Institute are of opinion that, in view of the rapid expansion of the industry, particularly in the South, production will exceed domestic requirements, plus export possibilities, in 1959-60 and may well reach 3,960,000 tons unless restricted. Brazil is entitled to export 858,000 tons in the current season, including the balance of the 1958-59 quota, but notwithstanding a cut of 594,000 tons, already made in production quotas, an excess of 303,600 tons is anticipated at May 31, 1960. The situation is alarming owing to the accumulation of stocks left over each season and instead of restricting production further the Minister of Finance has agreed to purchase and store the excess in order to stabilize prices.

During the year 1958 Brazil exported 834,450 short tons of sugar, the price averaging U.S.$67.54 per ton. Shipments this year to May 31st totaled 299,646 tons, at an average price of U.S.$68.80 per ton. Sugar is now Brazil's third most important export product, ranking next to coffee and cocoa.

A new co-operative society has been organized in Sao Paulo to unite sugar manufacturers and alcohol distillers throughout the State. Members, already joined, contribute 80% of total production, and a business movement of 15,000 million cruzeiros is expected annually at the outset. The society's primary objects are to receive, finance and sell crystal sugar and alcohol for its associates, thus supplementing the assistance given by the Institute. Other aims are to standardize production for exportation, expand the domestic market by improving distribution and providing storage facilities in the interior of Sao Paulo and adjoining States.

Record Crop Expected In Canada

MONTREAL, SEPTEMBER 28: Ontario's sugar beet harvest has started and officials of the Canada and Dominion Sugar Co. at Chatham are predicting the largest crop in history.

Altogether there are 34,073 acres to be harvested, and the yield has been estimated at 14 tons per acre. Last year, a record season, 31,583 acres yielded 462,583 tons for an average of 14.65 tons per acre.

Personal press station

• At the Annual Meeting of the American Sugar Cane League on September 24th in New Orleans, **Warren Harang, Jr.,** of Thibodaux, La., was elected president. He is the twentieth League president.

• **Henry Higashiyama** has been named Preparation and Transportation Superintendent for Waialua Agricultural Co. of Hawaii. He is responsible for the coordination of planting, plowing, ratooning and field transportation.

• California & Hawaiian Sugar Refining Corporation announced the election of **W. L. Winston** to the board of Directors of C. & H. He fills the vacancy created by the retirement and resignation of **Starr Bruce** from the C and H Sugar Board.

• Announcement has been made by A. G. Budge, president of the Hawaiian Sugar Planters Association, that **Slator M. Miller,** vice-president and Washington representative of the Association, will return to the main office in Hawaii as vice-president and secretary. Mr. Miller, well known throughout the sugar industry, has been with HSPA since 1928. In 1951 he came to Washington and has headed the Washington office since 1956 when Ernest Greene retired. The Washington post will be filled by **Sanford L. Platt** who has been secretary of HSPA in Hawaii since 1954. Mr. Platt was born in Texas and has had extensive experience in public relations as well as in the sugar industry. Prior to becoming secretary he worked with HSPA in the Philippines and later as a staff member of the Hawaiian Experiment Station. He is expected to assume his duties in Washington on or before the first of the year.

Slator M. Miller

S. L. Platt

• American Molasses Company has appointed **Andrew P. DaPuzzo** as a sales-service representative in their Technical Service Department. He has had considerable experience in the industry in production, product control and laboratory testing and development. **Irving L. Cook** has been made Director of Sugar Sales for the Eastern Territory for American Molasses Company. His previous experience has been in candy, chocolate, biscuit and ice cream industries.

• **James Smith, Jr.,** has been named assistant agriculturalist of Oahu Sugar Co. He fills the position vacated by **Ted Sparrow** who has taken over as agriculturalist at Kohala Plantation Co. Oahu Sugar has appointed **W. Lyde McCleery** as Construction Superintendent.

• California and Hawaiian Sugar Refining Corp. has made several changes in its staff. **Dr. Phillip S. Meade,** who is widely known in the sugar industry, has been named to the position of Technical Director. In this capacity he will assume broader responsibilities for corporate technical activities and will continue to head the Technical Department. **Dan C. Crocker** has been appointed Assistant to the Advertising and Sales Promotion Manager. **Walter M. Lamb** was promoted to Staff Assistant-Grocery Product Sales. **W. Ray Junk** was named Director of Product Development and **William G. Watt** was appointed Manager of Purchasing and Packaging. Two Crockett refinery staff members were appointed to newly created positions, **D. Blaine Lott,** formerly Crystallization Supervisor, was named Process Specialist-Refinery and **Lyle A. Zemanek,** an Associate Technologist, was appointed Process Specialist-Char House. **Jay L. Meikle,** former Staff Assistant, is now Process Superintendent and **Edwin R. Duncan** is Packaging Superintendent. Meikle and Duncan will be responsible for the packaging and processing functions within the department. They will report to Assistant Production Manager **Ray Solberg** who has returned from the C & H Aiea Refinery in Hawaii, where he has served as Refinery Superintendent for the past year.

• *C. E. Waring, Chief Chemist for Atlantic Sugar Refineries, New Brunswick, Canada, is a First Vice President of Sugar Industry Technicians for 1959.*

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Beet & Cane In West Pakistan

By Dr. H. Kampf, Dr. Tech. Sc., F.R.I.C.

On completion of the cane crop in West Pakistan in July a ten day trial of the new beet sugar equipment at Charsadda Sugar Mills, Ltd. was run. In the June 1959 issue of SUGAR y AZUCAR, Vol. 54, No. 6, page 30, the author published an article on the establishment of a beet industry in Pakistan. The beets were experimentally crushed in the mill tandem and such favorable results were obtained that foreign exchange was made available for the purchase of conventional beet equipment. Plant capacity is 1,500 tons of beets per day. Beet cosettes are continuously weighed and delivered to a continuous diffuser. Diffusion juice is pre-defecated, clarified, treated with milk-of-lime and carbonic acid in the existing cane sugar mill that was erected in 1956. From there on the cane house equipment is used. The diffuser and other equipment was supplied and installed by Buckau R. Wolf, A. G. of West Germany, the same firm that installed the cane milling equipment.

The success of the trial run on beets was significant for Pakistan, since the government will now allow the Premier Sugar Mill at Mardan and the Frontier Sugar Mill at Takht-I-Bhai to import machinery for the preparation and diffusion of beets in addition to their present handling of cane.

The cane harvest in Pakistan was one of the most successful in the history of the industry. At the end of the crop on July 15th, 2,340,000 short tons of cane had been ground for the production of 187,000 short tons of white sugar. During the ten day trial run on beets at Charsadda, 5,000 short tons of beets were sliced. An additional 3,480 short tons of beets were crushed in the cane mills of Premier and 4.95 tons of beets were crushed in the cane tandem at Leiah Sugar Mill.

Premier Sugar Mill at Mardan, one of the Pakistan cane mills that will handle beets following the cane crop. Beet diffusion equipment will be installed in the near future.

■

Large De-Watering Press Added To Cane Diffuser

A nine-ton, $45,000 press to de-water bagasse being discharged by the Silver experimental slope diffuser in Hawaii, has been installed as another phase of the project at Kekaha Sugar Co. on Kauai.

By running the water squeezed out of the bagasse back through the diffuser, experimenters expect to boost the extraction rate to over 98%, according to Dr. J. H. Payne, principal technologist of the Hawaiian Sugar Planters' Association Experiment Station. This compares with average of 94% extraction by the conventional sugar mill in Hawaii. The press, built by French Oil Mill Machinery Co. of Ohio, is designed to take bagasse from the diffuser and remove excess water down to about the 45% moisture level. This is about the level of the bagasse from the conventional mill. Bagasse from the diffuser now has a moisture level of about 87%. The press is designed to handle all the bagasse from the diffuser. This amounts to about 17 tons an hour at present. About 10 feet long, eight feet high and eight feet wide, the press is located at the discharge end of the diffuser. It takes the moist bagasse from the diffuser's discharge scroll, de-waters it and discharges it, all mechanically.

The diffusion project is now a cooperative experiment among the HSPA, Kekaha, the Silver Engineering Works of Denver, Colo., makers of the diffuser, the Reitz Manufacturing Co. of Santa Rosa, California, which makes components, and the French Oil Mill Machinery Co.

■

Sugar Quota Hearings

Public hearings to assist the Secretary of Agriculture in determining sugar requirements in the United States for 1960 will be held in Washington, D.C. on November 24th beginning at 10:00 a.m. The hearings, at which interested persons may present data and views, will be held in the Thomas Jefferson Auditorium, South Building. Data, views or arguments regarding quotas for local consumption in Hawaii and Puerto Rico may be submitted in writing; these matters will not be considered at the November 24th hearing.

■

Eighth Beet Factory on Hokkaido

Plans have been completed for the construction of a 1,200 ton per day beet sugar factory on the Island of Hokkaido, Japan. The factory will belong to the Hokuren Company of Sapporo, Hokkaido and will be built at a cost of $5,560,000. Provision has been made for a subsequent increase in slicing capacity to 1,600 tons of beets per day.

■

Metric System Adopted In Mexico

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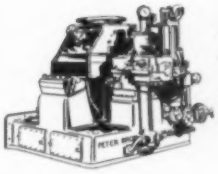

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■

New Sucro-Chemical Product

The National Sugar Refining Co. has patented a new sucro-chemical product in the form of a "sticker," which has been found to cause solutions of insecticides to stick when sprayed on the leaves of plants that have been attacked by insect pests. It is made of sugar in combination with certain resins, which are insoluble and form a coloidal substance that, when the water evaporates, remains on the leaves as a thin tacky film that holds the bug poison longer, and is not easily washed off by rain. It may be mixed with any kind of insecticidal material. For this purpose it is said to be better than other sticking agents. Cane growers may be interested in the fact that it performs well when mixed with ryania an insecticide that is used in Louisiana against cane borers. Free samples sufficient for 100 gallons of spray are available on request.

■

Spanish Brochure on Valves and Fittings

Plastic or rigid polyvinyl valves and pipe fittings, now becoming increasingly popular in sugar mills and refineries, are described in a brochure recently issued by the Walworth Company, for distribution to sugar factories in Latin America. This type of valve or fitting has proved useful in dealing with corrosive or abrasive liquids. Copies of this Spanish-language brochure may be obtained without cost from the Walworth Company or from the book department of SUGAR Y AZÚCAR.

■

Sugar Research Foundation To Spend $250,000

More than a quarter of a million dollars will be spent in the next year on research in the United States and other countries by the Sugar Research Foundation according to an announcement by Dr. H. B. Hass, President. The projects, covering a wide range of subjects, will concentrate on food technology and non-food uses for sugar. Two research projects are scheduled in the public health area, and the Foundation will again make a grant to the Department of Nutrition of Harvard's School of Public Health. The new budget for the fiscal year commencing July 1st reflects the Foundation's growing emphasis on food technology. Approximately one-third of this year's research budget will be spent on food technology, considerably more than in the past, Dr. Hass stated. Much of the work being financed by the Foundation is being carried out in Cuba, Canada and England.

■

Exports From Turkey

With sugar production in Turkey in excess of 440,000 short tons, 44,000 tons are available for export and sales of 15,000 tons at $77.00 per ton plus 5,000 tons at $77.50 f.o.b. Turkish ports have been made to Israel for September-January 1960 delivery. A second sale on the same terms has been made to French operators.

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AZÚCAR

Noviembre 1959

Esbozo del Tema de la Reunión de Técnicos Azucareros de Puerto Rico

Por H.A. Willett

Presidente, Asociación de Técnicos Azucareros de Puerto Rico

Los socios e invitados de la Asociación de Técnicos Azucareros de Puerto Rico se reunirán los días 3, 4 y 5 de diciembre en el hermoso Hotel Caribe Hilton para discutir diversos problemas y los adelantos registrados durante el año de 1959. Aunque el año actual probablemente llegue a ser uno de los mejores del próximo pasado, no ha carecido de problemas y dolores de cabeza para este grupo de técnicos. Será la discusión de estos problemas entre los distintos expertos lo que hará esta reunión interesante para todos los concurrentes.

Debido a la campaña tan desalentadora de 1958, la industria azucarera ha comprado muy poca maquinaria nueva, por lo que trató de elevar la eficiencia de sus operaciones y obtener el máximo rendimiento del equipo ya en existencia. Para lograr lo anterior, muchas compañías azucareras se han valido de la técnica industrial con excelentes resultados. Estos métodos han encontrado gran oposición de parte de las uniones de trabajadores locales. En la mayoría de casos, y tras un programa de persuación bien dirigido, las uniones se convecieron de que esta nueva norma era lo más acertado, tanto para los unionistas como para las empresas azucareras. En tales casos, las nuevas normas fueron aprobadas. En otros casos, no obstante, la oposición fue tan fuerte que fue necesario abandonarlas. Para ayudar a resolver este problema, el gobierno de Puerto Rico se dirigió a la industria con un programa de su parte ecaminado a ayudar en el entrenamiento de personal para las compañías azucareras y a establecer normas de trabajo para toda la industria. Este programa será tratado en la próxima reunión de la A.T.A. por el Sr. Raúl Tous, quien dirige este esfuerzo de parte del Gobierno.

La conservación de los cañaverales libres de maleza asume cada vez mayor importancia en Puerto Rico, donde una deficiencia en nuestra cuota anual exige mayor producción de nuestras mejores tierras. Como sucede en la mayoría de casos, la mejor forma de corregir las dificultades es evitarlas. Esto explica el creciente interés en toda la Isla en el sistema de represión de

H. A. Willett

malezas previo a la germinación. Durante el año pasado, la extensión de los campos tratados por este sistema (labores manuales o aspersiones aéreas) fue 300 por ciento mayor. Las dificultades encontradas al iniciar este trabajo en Puerto Rico serán discutidas en la reunión por pilotos de aviones y personal de campo. La diversidad de ideas sobre la clase y cantidad de materiales a usar en este sistema debiera hacer esta discusión sumamente interesante.

Con el aumento en la extensión sembrada por el "sistema de Louisiana modificado", los operadores de plantaciones están encontrando cada vez mayor dificultad en introducir en los cañaverales máquinas de bajo despejo o espacio libre. Esto ha creado la necesidad de tener que raer los rastrojos de las cepas de caña de retoño, cosa que jamás se había hecho en Puerto Rico anteriormente. Los funcionarios de tres empresas azucareras que han realizado trabajos de esta índole informarán sobre su experiencia.

El principal problema confrontado por los dueños de ingenio sigue siendo la creciente cantidad de caña recogida a máquina, entregada a las fábricas cada año. Las lavadoras de caña o plantas de limpieza intaladas en algunos centrales serán discutidas por empleados de fábricas. La diversidad de ideas y teorías sobre este punto indudablemente provocarán una interesante discusión. Durante las últimas tres campañas, la cantidad de caña recogida a máquina aumentó de 10% a 30% de la caña total molida.

En el departamento de elaboración se ha adelantado mucho en el manejo de jugos sucios. En la reunión se presentará un informe sobre el progreso logrado con el proceso Elguanite en el Central Cortada. El Central Guánica presentará un escrito sobre el empleo de Separan como un auxiliar en su proceso de elaboración.

El empleo de sistemas automáticos ha asumido importancia para aquellos centrales que se ven confrontados por jornales cada vez más elevados. El acontecimiento más importante en relación con lo anterior probablemente sea el sistema de autoalimentación y regulación de los molinos instalado en el Central Igualdad. El Sr. Emilio Morales, miembro de la gerencia de este central, presentará un informe sobre los buenos resultados obtenidos en su primera campaña con equipo perfeccionado por dicha central.

Iniciando una nueva norma, la Asociación ha enviado al Décimo Congreso de la SITAC en Hawaii dos de sus socios en calidad de representantes. Estos socios presentarán un informe detallado sobre su viaje, el cual incluirá diapositivas y películas tomadas en dicha ocasión. Habiendo visto estas películas, puedo asegurar que son muy completas y sumamente interesantes.

Al presentar esta reseña de lo que se ofrecerá en la reunión, confiamos en que habremos despertado el interés de nuestros socios e invitados para que concurran a esta reunión. Es nuestro deseo que todos aquellos relacionados con la industria azucarera asistan a estas reuniones, a fin de promover nuestro programa de intercambio de ideas entre los azucareros del mundo.

PROGRAMA DE TECNICOS AZUCA

HOTEL CARIBE HILTON

JUEVES—3 DE DICIEMBRE:

9:00 A.M. — INSCRIPCION

9:30 A.M. — DISCURSO DE BIENVENIDA—
Dr. Ramírez Silva.

10:15 A.M. — INFORME SOBRE LA CONFERENCIA DE TECNOLOGOS AZUCAREROS INTERNACIONES—
Antonio Roig Jr., Héctor Mayol y Rubén A. Bonilla.

11:45 A.M. — PROGRESO MEDIANTE EL ESTUDIO EN PUERTO RICO

12:15 P.M. — SERVICIOS OFRECIDOS A COLONOS EN PUERTO RICO—
Guillermo Esteves Jr.

1:00 P.M. — COCTELES Y ALMUERZO DE FIAMBRES

VIERNES—4 DE DICIEMBRE:

Seccion I—Grupo Agricola

9:00 A.M. — INSCRIPCION Y CAFE

9:30 A.M. — RAEDURA DE RASTROJOS EN LOS CENTRALES ROIG, AGUIRRE Y COLOSO

10:00 A.M. — PROGRESO CON HERBICIDAS EN PUERTO RICO—
Nogueras, Luce & Co., P. Carreras, Central Mercedita, N. Cardona, Comunidad Agrícola Bianchi, y Frank Dupre.

10:30 A.M. — ESTADO ACTUAL DE LAS ASPERSIONES DE NUTRIENTES—
George J. Landrom.

11:15 A.M. — INFORME SOBRE EL PROGRESO DE LA INGENIERIA INDUSTRIAL EN PUERTO RICO—
Exio Mejía, Central Aguirre Sugar Co., y Rafael Bird, Central Roig.

12:15 A.M. — PROGRESO EN LA CONSERVACION DE MAQUINARIA AGRICOLA EN CAMPOS DE LUCE & CO.—
Patrick Gray y W. Nelthropp.

1:15 P.M. — ALMUERZO DE FIAMBRES

1959 ASOCIACION DE REROS DE PUERTO RICO

SAN JUAN

VIERNES—4 DE DICIEMBRE:

Seccion II—Grupo Fabril

9:00 A.M. — INSCRIPCION Y CAFE

9:30 A.M. — CAPACIDAD DE LOS CENTRALES EN PUERTO RICO Y DURACION DE LAS CAMPAÑAS—
Miguel A. Arsuaga Roure.

10:30 A.M. — ALIMENTACION AUTOMATICA EN UN CENTRAL—
Emilio Morales, Central Igualdad.

11:15 A.M. — EL PROCESO ELGUANITE EN CENTRALES DE LA EMPRESA AGUIRRE—
Miguel A. Ballester Jr., Central Cortada.

11:45 A.M. — EXPERIMENTOS CON SEPARAN EN EL CENTRAL GUANICA—
Roberto Ramírez.

12:15 P.M. — LIMPIEZA DE LA CAÑA EN EL CENTRAL CORTADA—
Gerencia del Central Cortada.

12:45 P.M. — CUCHILLAS DE CAÑA MEJORADAS—
José A. Lomba.

1:15 P.M. — ALMUERZO DE FIAMBRES

SABADO—5 DE DICIEMBRE:

10:00 A.M. — PROGRAMA DE JORNALES INCENTIVOS PARA EL CORTE DE CAÑA—
R. J. Tous.

11:00 A.M. — REUNION DE TRABAJO Y ELECCION DE LA DIRECTIVA

12:30 P.M. — AGASAJO CON COCTELES A LAS DIRECTIVAS ENTRANTE Y SALIENTE

COMITE EJECUTIVO PARA 1959

HAROLD WILLETT ..... Presidente	M. V. CAPLLONCH ..... Tesorero
CHARLES HAEUSSLER . Vicepresidente	RAFAEL HILERA ..... Secretario

El Central El Ejemplo en la parte oriental de Puerto Rico, con una capacidad de 1,560 toneladas de caña diarias, está situado en un hermoso paisaje cerca de la carretera de Humacao a Yabucoa.

Sugerencias Sobre la Racionalización de la Industria

Capacidad Fabril y Duración de la Campaña en Puerto Rico

Por Miguel A. Arsuaga Roure

El presente artículo es una transcripción de las conclusiones generales del autor sobre la relación de la capacidad fabril a la duración de la campaña de recolección. El autor opina que la situación ideal en Puerto Rico sería un grupo de grandes fábricas entre algunas pequeñas, todas trabajando con variedades de caña de alto contenido sacaroso que puedan ser cosechadas sucesivamente en un período de ocho meses. Él admite que esta es una propuesta explosiva, y expone su criterio directamente y con vigor. Para más detalles, el lector debe consultar el trabajo completo escrito para ser presentado en la Reunión de la Asociación de Técnicos Azucareros de Puerto Rico de 1959.—* *Editor.***

AHORA, estudiando los casos resumidos en las tablas números I y II es aparente que hay en general una cosecha dada para cada tamaño de central para un beneficio máximo por tonelada de caña. Si se aumenta el tamaño de la central, también deberá aumentarse el tamaño de su cosecha en una proporción que parece girar alrededor de cien veces la capacidad diaria.

Pero si se aumenta o se alarga demasiado la cosecha entonces baja el rendimiento porque hay que cubrir un área muy ancha debajo de la curva del dulce. En esto estriba a mi modo de ver parte de la baja en rendimiento que se nota en los últimos años, y que aparentemente es difícil explicar según ha dicho la prensa.

Ciertamente parece claro, de la tabla número 6, que con la forma en que se cosecha caña hoy en Puerto Rico la idea de aumentar la capacidad para moler la misma caña más económicamente es un error a menos que el aumento en capaicdad se obtenga con una inversión relativamente pequeña o sin inversión alguna o a menos que sea el caso que la relación cosecha-capacidad-rendimiento así lo ameriten.

Todo esto no quiere decir que debe rehuírse el aumento de molienda en una fábrica bajo toda condición con la zafra corta. Si por circumstancias específicas la cosecha aumenta considerablemente, ciertamente no es práctico instalar dos centrales pequeñas en vez de una del doble de la capacidad, pues la inversión inicial y los costos fijos combinados serían probablemente más del doble en las dos centrales pequeñas que en la mayor, con la consiguiente pérdida en ventaja económica y el deterioro de su posición competitiva.

Pero todo esto sí indica que las supercentrales de alta capacidad no son necesaria-

mente la solución de los problemas de la industria, y que el aumento de capacidad de una central en particular no necesariamente va a darle mayor ventaja económica si ese aumento en capacidad se obtiene a base de aumentar aún más su inversión capital por tonelada de azúcar y a base de aumentar sus otros problemas de arrimo y personal.

También apunta todo esto hacia la necesidad de mejorar la extracción y recuperación de las fábricas, y por ende el rendimiento, con un mínimo de inversión; y a la vez de alargar la zafra a buen dulce en la caña para reducir los costos fijos en proporción a la economía total de la fábrica. Apunta esto también a la necesidad de reducir los costos fijos y variables en la fábrica y el campo escudriñando y aprovechando cuanta oportunidad se presente para ello no necesariamente dejando ciegamente de gastar sino gastando sólo en aquello que va a reducir costos.

Por otro lado, como hemos visto ya la central mayor produce más azúcar que la menor, con la misma caña, de lo que se deduce que con varias supercentrales de alta capacidad se podría cubrir la cuota azucarera de la isla con menos tierras.

¿Pero cómo mejorar estas características de la industria que nos condenan a una economía de sobresaltos y vicisitudes? Porque la cuota azucarera fija la cosecha de caña en la isla, la relación cosecha-capacidad fija la capacidad de molienda en la isla, la capacidad fija en parte el rendimiento y el precio del azúcar lo fijan condiciones fuera de nuestro control así como en gran medida los jornales, costos de materiales, etcétera. No parece sino que estamos condenados a bregar con los únicos dos o tres factores que quedan enteramente o en parte bajo nuestro control.

Aparentemente, haciendo un recuento realista, no nos queda más que rendimiento, cosecha, tiempo de molienda, capacidad de molienda y variedades de caña como factores de gran efecto sobre la economía azucarera de entre los cuales podríamos hallar una solución a nuestra desvaneciente perspectiva azucarera.

Es pues de entre estos factores de donde habrá de surgir alguna solución realista como la que se necesita.

El trio de factores que más afecta la economía azucarera es el rendimiento, el precio del azúcar, y el tamaño de la cosecha.

El rendimiento lo podemos mejorar acortando la zafra con más supercentrales y sembrando mejores variedades de caña. Pero la supercentral agravaría aún más el problema obrero y tendría un límite en cuanto a inversión por tonelada de azúcar o por dólar de beneficio.

En cuanto al precio de azúcar ya vemos que está tan fuera de nuestro control que no vale la pena discutirlo. Casi lo mismo se puede decir de la cosecha máxima total.

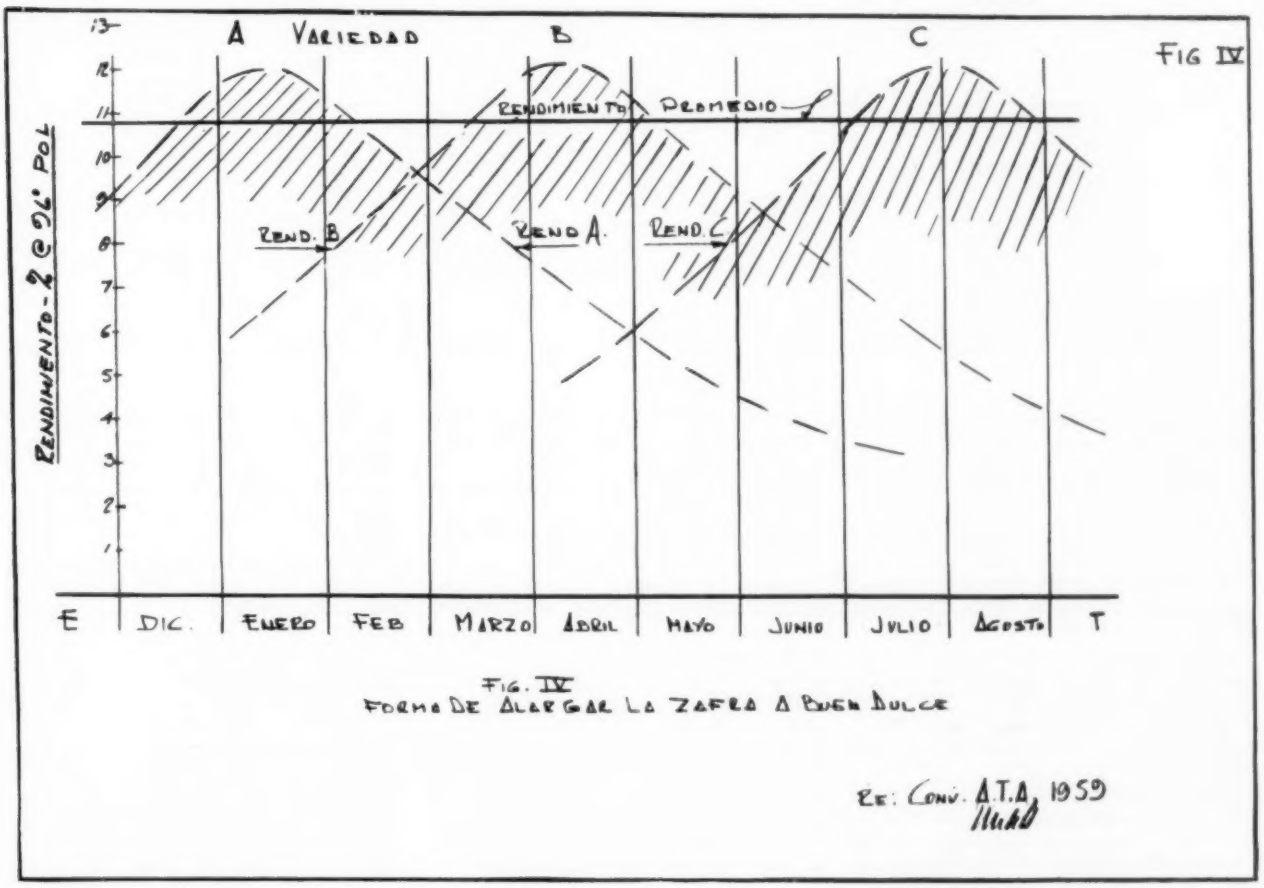
Y aquí es donde viene aquello de alborotar el avispero.

Según hemos examinado varias operaciones sintéticas bajo la forma actual de molienda de zafra corta y alta capacidad de centrales, vamos a ver que pasa si nos inventamos una manera diferente de hacer la misma azúcar del año dentro de la libertad de acción que ya hemos mencionado.

Trabajando con número redondos digamos que nuestra cuota azucarera es de 1,200,000 toneladas de azúcar. A 12% de rendimiento esto equivale a 10,000,000 toneladas de caña.

Podríamos moler esta caña con el sistema actual en 100 días de molienda efectiva con 100,000 toneladas diarias de capacidad de molienda como ahora o podríamos molerla en 200 días con 50,000 toneladas de capacidad diaria asumiendo que se sembrara en tal forma y tales variedades de caña que hubiera cañas en todo tiempo a buen rendimiento como lo hay ahora en abril.

Por feliz coincidencia la capacidad promedia de las centrales en Puerto Rico hoy es de unas 3,200 toneladas diarias. De estas centrales necesitariamos unas 16 para



Características Ecónomicas de Centrales

Tabla I

CASO	A	B	C	A
Rendimiento	10.5	10.5	10.5	11.5
Capacidad	3,000	3,000	3,000	3,000
Precio	5.25	5.70	6.25	5.25
1. Cosecha total, toneladas	300,000	300,000	300,000	300,000
2. Capacidad diaria, toneladas	3,000	3,000	3,000	3,000
3. Dias de molienda efectiva	100	100	100	100
4. Dias de zafra	120	120	120	120
5. Rendimiento, %	10.5	10.5	10.5	11.5
6. Azúcar Producida, ton.	31,500	31,500	31,500	34,500
7. Mieles producidas, gal.	1,500,000	1,500,000	1,500,000	1,500,000
8. Precio azúcar por ton. (T.F./ton.)	105	114	125	105
9. Precio mieles por gal.	7c	7c	7c	7c
10. Ventas totales azúcar	3,307,500	3,591,000	3,937,500	3,622,500
11. Ventas totales mieles	105,000	105,000	105,000	105,000
12. Ventas totales, dólares	3,412,500	3,696,000	4,042,500	3,727,500
13. Valor total de la propiedad	2,500,000	2,500,000	2,500,000	2,500,000
14. Valor propiedad menos tierras	2,491,000	2,491,000	2,491,000	2,491,000
COSTOS FIJOS				
15. (a) Depreciación (5%/año)		124,550		
16. Contrib. propiedad a 1.6%		40,000		
17. (b) Rep. tpo. muerto, mtls. & jorn. (est.)		120,000		
18. Seguros		60,000		
19. Gastos generales fijos		60,000		
20. Sueldos empl. permanentes		50,000		
21. Costos fijos totales	454,550	454,550	454,550	454,550
COSTOS VARIABLES				
22. Gastos generales variables		40,000		
23. (d) Sueldos y jornales variables		170,000		
24. Materiales		30,000		
25. Fuerza eléctrica comprada		3,000		
26. Reparación de tiempo zafra		30,000		
27. (e) Costo acarreto de caña		225,000		
28. Sacos de yute		97,650		
29. (f) Gastos mercadeo		450,000		
30. Arbitrios		31,500		
31. Total costos variables de operación	1,077,150	1,077,150	1,077,150	1,132,450
32. (g) Participación colonos en azúcar	1,910,812	2,025,945	2,249,438	2,049,822
33. Part. colonos en mieles	12,000	12,000	12,000	12,000
34. Costos variables	2,999,962	3,115,095	3,338,588	3,194,272
35. Costos totales variables y fijos	3,454,512	3,569,465	3,793,138	3,648,822
36. Beneficio ex-contr. sobre ingresos	42,012	126,535	249,362	78,678
37. Beneficio % de inversión capital	1.68	5.06	9.97	3.15
38. Beneficio fábrica $/ton. caña	0.14	0.421	0.831	0.262
39. Punto crítico molienda, tons. caña	337,500	255,000	193,750	257,500

dar cuenta de la cuota y la cosecha moliendo 200 días al año o sea unos 8 meses. O, podríamos hacer lo mismo con 30 centrales de 1,700 toneladas diarias de capacidad promedia.

La Central de 3,200 T/D de capacidad molería una cosecha de 640,000 toneladas.

La Central de 1,700 T/D de capacidad molería una cosecha de 340,000 toneladas al año.

En las tablas 8 y 9 vemos lo que ocurriría siguiendo un patrón paralelo al de las tablas y gráficas anteriores.

Me parece que podemos llegar a las siguientes conclusiones a base de todo este análisis por lo menos:

1. Indudablemente las centrales de zafra larga que hemos analizado representan una economía azucarera más estable y más saludable que las centrales de zafra corta tanto para la fase fabril como para la fase agrícola, como también para el sector obrero.
2. El costo de jornales es aparentemente un mito en aras del cual la industria azucarera de este país se está precipitando al caos sin necesidad.

¿Ahora, como vamos a conseguir caña de buen dulce durante ocho meses en vez de cuatro? La opinión de muchos expertos en la materia es de que es enteramente posible y técnicamente fácil de conseguir. El año pasado un funcionario de la Estación Experimental Agrícola indicó la viabilidad técnica de hacer esto. Ciertamente si fué posible crear habichuelas tiernas sin hilachas se debe poder crear dulce en la caña por mayor tiempo, posiblemente sembrando tales varidades y en tales fechas del año que unas siembras maduren en abril, otras en febrero, otras en marzo, otras en mayo, otras en junio, y así sucesivamente, de manera que el efecto sea parecido a lo que se ilustra en la figura IV. Tengo entendido que en otros países se consigue esto.

El problema mayor parece ser el financiamiento de este cambio, pero así como soy mal experto en la técnica y economía azucarera lo soy peor en asuntos agrícolas y mucho peor en finanzas. Por eso dejo estos campos a otros que tengan el mismo buen deseo de sacar tan valiosa industria del laberinto en que se halla.

Antes de terminar quiero apuntar, como cosa que afecta la renovación o sustitución de variedades, que la forma en que se analizan las cañas para prorratear entre los colonos su participación de azúcar, no es conducente a que el agricultor se interese

Azucareras Cosecha Larga

Tabla II		Tabla III			Tabla IV		
B	*C*	*A*	*B*	*C*	*A*	*B*	*C*
11.5	11.5	12.5	12.5	12.5	13.5	13.5	13.5
3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
5.70	6.25	5.25	5.70	6.25	5.25	5.70	6.25
300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000
3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
100	100	100	100	100	100	100	100
120	120	120	120	120	120	120	120
11.5	11.5	12.5	12.5	12.5	13.5	13.5	13.5
34,500	34,500	37,500	37,500	37,500	40,500	40,500	40,500
1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000
114	125	105	114	125	105	114	125
7c	7c	7c	7c	7c	7c	7c	7c
3,933,000	4,312,500	3,937,500	4,275,000	4,687,500	4,252,500	4,617,000	5,062,500
105,000	105,000	105,000	105,000	105,000	105,000	105,000	105,000
4,038,000	4,417,500	4,042,500	4,380,000	4,792,000	4,357,500	4,722,000	5,167,500
2,500,00	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000
2,491,00	2,491,000	2,491,000	2,491,000	2,491,000	2,491,000	2,491,000	2,491,000
	124,500						
	40,000						
	120,000						
	60,000						
	60,000						
	50,000						
454,550	454,550	454,550	454,550	454,550	454,550	454,550	454,550
	40,000		40,000			40,000	
	170,000		170,000			170,000	
	30,000		30,000			30,000	
	3,000		3,000			3,000	
	30,000		30,000			30,000	
	225,000		225,000			225,000	
	106,950		116,250			125,550	
	493,000		535,000			576,315	
	34,500		37,500			40,500	
1,132,450	1,132,450	1,186,750	1,186,750	1,186,750	1,240,365	1,240,365	1,240,365
2,253,200	2,501,772	2,262,662	2,487,100	2,761,412	2,291,287	2,537,325	2,838,037
12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000
3,397,650	3,646,222	3,461,412	3,685,850	3,960,162	3,543,652	3,789,690	4,090,402
3,852,200	4,100,772	3,915,962	4,140,400	4,414,712	3,998,202	4,244,240	4,544,952
185,800	316,728	126,538	239,600	377,788	359,298	477,760	622,548
7.43	12.67	5.06	9.58	15.11	14.37	19.11	24.90
0.619	1.055	0.421	0.798	1.259	1.197	1.592	2.075
216,750	180,000	238,000	200,000	167,500	165,000	143,750	127,000

en sembrar variedades nuevas en busca de mejor rendimiento por cuerda. Ahora sólo se toma en cuenta el brix y la polarización para determinar el rendimiento. No entra en la determinación del rendimiento la cantidad de jugo en la caña de ningún colono en particular, lo que trae como consecuencia que el análisis es puramente qualitativo y no cuantitativo. Una caña puede producir una pequeña cantidad de jugo de alto brix y polarización y darle al colono el mismo rendimiento y participación que otra que produce el mismo brix y polarización pero más jugo. Como consecuencia el colono no ve la necesidad o ventaja de cambiar su caña puesto que lo que le interesa no es aportar mucho azúcar por tonelada de caña sino aportar poco brix y alta polarización.

Si con todo esto he enfurecido a unos y por lo menos he interesado a otros en buscar nuevos derroteros a la industria me doy por satisfecho.

Conferencia Sobre Capacidad de Molienda y Largo de Zafra
Notas

1. La curva de costos totales no es una recta en realidad como no lo es la de costos variables porque algunos de los costos varían con el largo de zafra y otros con la capacidad de molienda y otros con la cantidad de azúcar y de mieles producidas. Esto se debe de estudiar.
2. Costos generales fijos se han tomado como constante a falta de mejor criterio.
3. Si los porcientos de beneficio se calculan incluyendo activo fijo y capital de operación entonces se reducirían a una fracción de lo que indican las tablas.
4. Cabe hacer una serie de estudios secundarios para ver la relación exacta entre las características económicas de la industria y se debe establecer un patrón de economía azucarera que sirva para comparar las diferentes centrales y su campo con este patrón ideal.
5. En vez de tener 30 centrales pequeñas o 16 centrales grandes se podría tener de los dos tipos cada tipo con su tamaño de cosecha apropiado.
6. Hawaii tiene 27 centrales con una cosecha de más o menos 1,000,000 tons. azúcar que a un rendimiento de 12%

(Sigue en la página 116)

Plan de Unidades de Trabajo e Incentivas

Su Aplicacíon al Corte de la Caña

Por Rafael Bird, Central Roig

A medida que la economía de Puerto Rico se va extendiendo, la fuerza de brazos disponible a la industria azucarera es cada vez más reducida, por lo que la completa mecanización se hace cada vez más sentida, tal como lo señala el Sr. Raúl Tous del Departamento de Agricultura y Comercio de Puerto Rico en un informe presentado en la Reunión Anual de la Asociación de Técnicos Azucareros de Puerto Rico en San Juan el 5 de diciembre.

El Sr. Tous advierte que durante el período de transición, hasta que se logre la mecanización total de la industria azucarera, es de suma importancia elevar la eficiencia del trabajador, siendo la mejor forma de hacerlo la adopción de un plan de unidades de trabajo e incentivas. Estas forma de remuneración, dice el Sr. Tous, eleva la eficiencia del trabajador y reduce los costos de producción. Además, el aumento de ingreso del trabajador lo induce a permanecer en la industria azucarera, lo que a la vez robustece la economía del país.

Durante 1959 se establecieron normas de trabajo, tomando en cuenta tales factores como las variedades de caña, las condiciones del suelo, los contornos del terreno, las condiciones climáticas, los sistemas de siembra, edad de la caña, rendimiento del campo, cañas quemadas y sin quemar, etc. Finalmente, el Sr. Tous anunció que se estaba preparando un manual de datos e instrucciones fáciles de poner en práctica, el cual se hará disponible a la industria azucarera tan pronto como esté listo.

Durante la sesión del 4 de diciembre, el Sr. Rafael Bird explicó el método de incentivas seguido en el corte de la caña en los campos de la empresa Antonio Roig Sucesores durante la segunda mitad de la campaña de 1959. El informe del Sr. Bird aparece a continuación.—*Editor.*

El corte de caña se venía haciendo por día pagándole igual a todos los cortadores. El resultado de este sistema es que crea un incentivo para producir menos, ya que el hombre con capacidad de mayor productividad al recibir el mismo jornal que el de menor productividad tiende a trabajar al ritmo de este último.

En otros sitios en Puerto Rico donde se trabaja por día se usa el incentivo de pagar 5-10-15 y hasta 20¢ más por día a los mejores hombres. Este sistema, a mi juicio, no es práctico.

1° Porque está basado en una apreciación arbitraria,

2° Porque sucede que muchas veces un cortador hace un esfuerzo por unos días para que le den la bonificación y luego cae en el viejo ritmo y cuando se le quita la bonificación entonces trae descontento,

3° No hay incentivo para la gran mayoría.

En otros sitios se trabaja por incentivo de grupo que también tiene el inconveniente de que todos reciben la misma paga cuando no todos producen igual o por lo menos no tienen la misma capacidad productiva y el resultado es que no se obtienen los beneficios máximos.

El corte de caña por incentivo en Antonio Roig, Sucres. es un plan voluntario e individual. Está basado en el pago de un jornal justo y razonable por un esfuerzo razonable de trabajo. Este esfuerzo razonable se mide científicamente por estudios de tiempo y el mismo es equivalente a una producción normal bajo ciertas condiciones en determinado espacio de tiempo.

El beneficio nuestro consiste, pues, en obtener la producción normal de cada cortador ya que el pago por toda la producción por encima de lo normal es totalmente para el trabajador. Es precisamente porque todo el esfuerzo sobre lo normal es para el obrero, y porque el mismo está determinado por métodos científicos de la ingeniería industrial, que entendemos que el corte por incentivo no es negociable con las uniones.

Para medir la productividad de cada hombre decidimos usar el sistema de vara usado por Luce & Cía. ya que los Sres. Hanson y Mejías de esta firma nos brindaron su cooperación, beneficiándonos con su vasta experiencia.

En siempras de 5′ una vara buena consiste

Aspersión de herbicidas antes de la germinación en la Estación Experimental Agrícola, Rio Piedras, Puerto Rico, empleando métodos y equipo para la represión de maleza. Foto por cortesía de la Estación Experimental.

Escena típica en Puerto Rico durante la campaña de recolección: descarga de la caña de carretas y transbordo a carros de ferrocarril para su transporte a la fábrica. Esta forma de manejo mecánico se viene usando desde hace años.

de 6 calles por 9′ de fondo o sea 270 pies cuadrados. Comoquiera que hay 42,305.44 pies cuadrados en una cuerda tenemos que hay 156.7 varas buenas por cuerda.

Los "standards" determinados por la firma Barrington Associates Inc. están expresados en minutos por varas buenas o sea, ¿Cuantos minutos toma a un hombre trabajando normalmente en picar una vara buena de cierta variedad, clase de caña y tonelaje? Así pues, en terreno llano, siempra tipo Louisiana, el standard para Primavera de la variedad H 32-8560 de 51 toneladas por cuerda es de 24.0 minutos en caña quemada.

PROCEDIMIENTO: Cada cortador lleva dos calles y cada dos cortadores tiran sus dos calles en un chorro. El capataz mide las varas lineales de dos calles que corta cada picador. Comoquiera que una vara buena se compone de 6 calles de 9′ y el picador lleva solamente 2 calles tiene que cortar 27′ de dos calles para cortar una vara buena.

Las tandas por necesidad deben ser pequeñas, de 26 a 28 hombres ya que el capataz además de supervisar el corte es el que apunta a cada hombre y le mide las varas lineales. Un capataz superior y con experiencia puede tener unos pocos más de obreros. El capataz además debe prestar atención especial a la calidad del corte, eso es, ver que se corte el tocón a flor de tierra, la forma correcta de poner la caña en el chorro para que la cargadora pueda recogerla eficientemente. Hay la tendencia en el corte por incentivo a no hacerlo eficientemente debido al afán de cortar un máximo de varas. El capataz deberá llevar el record también del tiempo trabajado de cada obrero ya que es necesario para el cálculo final.

Vamos a tomar como ejemplo a un picador cortando caña quemada de Primavera de 51 toneladas, variedad H 32-8560 con un standard de 24.0 minutos por vara. El picador corta 28 varas lineales y cambia de corte donde corta 28 varas lineales más y cambia otra vez y corta 10 varas lineales y trabaja un total de 7 horas 5 minutos. Esta es la información que el capataz suministra al listero.

Este se refiere a una tabla que contiene los siguientes datos de acuerdo con el precio de azúcar que prevalece. Asumamos un precio de $6.35

TABLA

Precio Azúcar	6.31-6.40
Jornal Básico	3.10
Subsidio	.585
Jornal/día	3.685
Jornal/minuto	.007677
Jornal/día Quemada	5.528
Jornal/min. Quemada	.01152

a—Suma las varas lineales 28 + 28 + 10 = 66 varas lineales.

b—Divide las varas lineales por 3 ó 66 ÷ 3 = 22 varas buenas.

C—Multiplica varas buenas X el standard 22 × 24 = 528 min. producidos.

d—Minutos trabajados 7 horas 5 minutos 7× 60 = 420 + 5 = 425 minutos trabajados.

4% Producción = 528 ÷ 4.25 = 124%.

f—Jornal ganado = min. producidos × valor min. = 528 × .01152 = $6.08.

Como sabemos las cabidas de las piezas sabemos también las varas buenas cortadas y estas buenas cortadas deben coincidir con las varas buenas reportadas por el capataz. Aceptamos hasta un 2% de variación como correcto. Cualquier variación mayor es investigada inmediatamente.

Hay la necesidad imprescindible de educar al personal no solamente en el procedimiento y cálculos sino también en la propaganda del plan y en una actuación que nos haga acreedores a la confianza del obrero y de la Unión.

Siguiendo los consejos del Sr. Mejías tuvimos reuniones con grupos de mayordomos, listeros, capataces, asignando las obligaciones de cada uno respecto al plan y estas reuniones fueron de gran provecho.

El plan está basado en la producción por día, así pues si un cortador produce 120% hoy y mañana produce 95% recibe 120% y 100%, respectivamente ya que también se le garantiza el jornal mínimo.

Una vez se anuncia la tasación de la pieza, la misma puede ser reajustada hacia arriba pero nunca hacia abajo. Si tasamos una pieza en 45 toneladas y da 42 toneladas pagamos por 45 toneladas. Sin embargo si da 48 tons. hacemos el correspondiente ajuste.

Tratamos con algún éxito de dar el precio a las 9:00 A.M., o sea, una vez el chorro de caña se ve, en vez de darlo antes de empezar el corte.

No permitimos que si un mayordomo se ha equivocado en la tasación a favor del obrero trate en la misma forma de recuperar lo que pagó de más.

El plan es completamente voluntario. Medimos a los que trabajan por día conjuntamente con los de incentivo y si producen más del "standard" se les paga. A excepción de una colonia el plan ha sido aceptado por los obreros y por las uniones.

Nos vimos obligados a hacer tablas para darles el precio en dinero por vara en vez de minutos por vara.

Antes de terminar dándole los resultados de costo por tonelada en los cortes de incentivo, deseo mencionar una experiencia importante al iniciar un corte de incentivo donde se ha estado trabajando por día.

Cuando se trabaja por día sin incentivo, el hombre está acostumbrado a un ritmo lento de corte y al iniciarse en el corte por incentivo le toma varios días en coger el ritmo acelerado que él puede sostener por 6-7 u 8 horas. En nuestro primer corte hubo hombres que empezaron a un ritmo tan acelerado que a las 3 horas estaban agotados e inmediatamente produjo una reacción desfavorable al plan. Afortunadamente el representante de Barrington nos informó que esta situación es normal al inicio de cualquier plan de incentivo. De ahí en adelante, cada vez que iniciamos un corte nuevo le explicamos esta experiencia y le aconsejamos que no se iniciaran con un ritmo muy acelerado. Hay siempre un grupo que trabaja a un ritmo acelerado por 4, 5 y 6 horas con % de producción de 160-170% y aún más.

El primer corte se empezó el 19 de marzo. A esa fecha habíamos cortado por día 158,187.27 toneladas de caña y quedaban por cortar 225,580.60. De estas últimas llegamos a cortar bajo incentivo 60,520 toneladas a un costo de $.99 contra un costo de $1.45 para las 323,249 toneladas cortadas por día.

Extractos de Publicaciones de Asociación de Técnicos Azucareros de Puerto Rico

Publicados bajos los Auspicios de la

Sociedad Internacional de Tecnólogos Azucareros de Caña

por Arreglo Especial con

SUGAR y AZUCAR—Dr. O. W. Willcox, Redactor Técnico

Grupo Agricola

Estado Actual de la Nutrición Foliar por Aspersión Revelado por Isótopos Radioactivos

GEORGE J. LANDROM, S. H. WITTWER, H. B. TUKEY, F. G. TEUBER y WM. G. LONG,* *Informe presentado a la Reunión de la Asociación de Técnicos Azucareros de Puerto Rico, Diciembre 1959.*

El progreso actual en la formulación de abonos químicos para aumentar los rendimientos de cosechas se caracteriza por la mayor solubilidad en agua y más alto análisis de los elementos minerales utilizados por las plantas. Conjuntamente con la mayor disponibilidad de abonos totalmente solubles, tanto en formulaciones secas como líquidas, vino el empleo más extenso y más frecuente de aspersiones y polvos contra las plagas. Esto, a la vez, vino acompañado de importantes adelantos técnicos en equipo para su aplicación.

En los ensayos con nitrógeno, fósforo, potasio y calcio, y con otros nutrientes de las plantas, al fertilizante se le agrega una pequeña cantidad de isótopo radioactivo o estable. Así, el fertilizante es "contrastado", el isótopo siendo absorbido, distribuído y utilizado por la planta del mismo modo que el fertilizante normal. De este modo, la absorción y utilización de cierto elemento nutriente por cualquier parte de la planta se puede seguir precisamente por el cómputo de radiaciones, película radiográfica, o un instrumento espectrográfico especial. Estos métodos son útiles para estudiar la absorción de nutrientes asperjados en las hojas. De este modo se pueden evaluar muchas de las variantes, internas y externas, que rigen la asimilación de nutrientes y la reacción de las cosechas, así como la eficacia y utilidad relativas de los diversos conductores químicos y métodos de aplicar los fertilizantes. Se ha encontrado que los siguientes datos generales son pertinentes a la absorción de nutrientes por las hojas de las plantas.

Nitrógeno, fósforo y potasio.—Aplicados en forma de aspersiones a las hojas y otras partes aéreas de la planta, estos nutrientes son rápidamente absorbidos y transportados a todas partes de la planta—a las raíces, tallos, flores, fruta, semilla y extremidades vegetativas en desarrollo. La velocidad de transporte ha sido calculada en una pulgada cada cinco minutos. El nutriente designado puede ser observado en todas partes de la planta al cabo de una hora después del tratamiento, y más de la mitad del nutriente aplicado puede ser absorbido por la planta dentro de 24 horas.

El fósforo aplicado a las hojas se acumula rápidamente en las regiones merismáticas en desarrollo, como los extremos de las raíces, extremos vegetativos en desarrollo, flores, fruta y semillas, y hasta en los embriones dentro de las semillas. En culturas de maceta con tierra de varios tipos, el ácido fosfórico P^{32} marcado fue aplicado al suelo en una banda en la región de las raíces, y la absorción fue comparada con las aspersiones a las partes aéreas a principios de la florescencia. En efecto, hasta el 95 por ciento del fósforo aplicado a las hojas de tomate puede ser utilizado por la planta. Esto representa el método más eficaz de aplicar el fertilizante hasta ahora concebido. El peor factor limitante en la alimentación foliar, que también fue revelado por radioisótopos, es que sólo parte, frecuentemente una pequeña parte, de las necesidades totales de nutrientes de las plantas puede ser satisfecha por aspersiones.

El momento oportuno es de suma importancia en las aspersiones nutricionales. En muchas cosechas frutales, la aplicación de nutrientes a las hojas frecuentemente sirve como una fuente más rápidamente disponible para la fruta en desarrollo que la derivada de tratamientos del suelo.

Absorción foliar de Urea C^{14} nitrogenada.—La urea es uno de los fertilizantes más útil y mejor conocido para aplicaciones foliares. En el caso de algunas cosechas hortícolas todas las necesidades de nitrógeno pueden ser satisfechas por unas cuantas aspersiones en el momento oportuno.

Se determinaron los coeficientes relativos aparentes de hidrólisis (utilización) de urea C^{14} aplicada a las hojas en el caso de varias cosechas vegetales y frutales y se compararon con ensayos de campo y de invernadero de la tolerancia del follaje de las mismas cosechas a las aspersiones de urea en libras por 100 galones de agua. De tales estudios se puede pronosticar la tolerancia de las hojas de diversas especies de plantas a las concentraciones de urea asperjada como nutriente.

Transporte del calcio en las plantas.—En contraste con el nitrógeno, fósforo y potasio, el radiocalcio aplicado al follaje no se mueve de las hojas, flores ni fruta asperjadas. Si es que lo hace, se mueve muy poco hacia abajo en la planta. Teóricamente, las hojas podrían ser ampliamente alimentadas con calcio y las raíces morirse de hambre. Es evidente, tal como lo revelan los radioisótopos, que las raíces de plantas sarmentosas tienen que depender de su propia absorción para el suministro de calcio. Sin embargo, el calcio y el magnesio químicamente aliados han sido usados con buenos resultados para aspersiones foliares en algunas cosechas como la de apio para la corección de desórdenes foliares, en tanto que los tratamientos del suelo o de las raíces resultan ineficaces. El estroncio y el bario, ambos parientes allegados del calcio, no se mueven de las hojas de las plantas.

Los nutrientes aplicados a las hojas se pueden perder por lixiviación en casos de lluvia. En un ensayo, la mayor pérdida ocurrió en plantas en la obscuridad plenamente alimentadas. Por lo tanto, los nutrientes en las partes aéreas de las plantas se pueden perder durante períodos de lluvia, lo que también puede ocurrir con posturas expuestas al rocío. Tales pérdidas pueden ser suficientes para alterar notablemente el desarrollo

* Preparado por Contrato AT(11-1)-195, División Biológica y Médica de la Comisión de Energía Atómica.

de las plantas, y deben ser tomadas en cuenta al analizar el follaje con el objeto de determinar su estado nutritivo.

Los estudios con isótopos radioactivos y estables sugieren que todos los nutrientes absorbidos por las raíces de las plantas también pueden ser absorbidos por las hojas asperjadas, por los tallos y por la fruta. La absorción de nutrientes por las hojas es transportada y utilizada en el desarrollo tal como sucede con la absorción por las raíces. Una posible excepción es el calcio, que se mueve muy lentamente de las hojas a las raíces, si es que lo hace.

Los nutrientes aplicados a las hojas son utilizados muy rápidamente, y el grado de eficacia de absorción puede ser mucho más alto que en los tratamientos del suelo, especialmente en el caso de fósforo. La capacidad de las hojas para absorber los nutrientes es enorme, y las buenas prácticas agrícolas deben reconocer esta función de las hojas.

El alto valor de las aspersiones nutricionales probablemente se reflejará en cosechas donde ciertos desórdenes causados por falta de nutrientes pueden ser corregidos fácilmente con tales aspersiones, donde las aspersiones ya son práctica corriente, donde el área superficial total del follaje es extensa, donde las condiciones no son propicias para la absorción de nutrientes por las raíces y cuando ocurre gran demanda de nutrientes como durante la florescencia y formación de la fruta. Estos valores están asociados con la alimentación de las hojas, no como substituto del abonamiento del suelo, sino por los efectos complementarios o fortalecedores. Con raras excepciones es posible, hasta con varias aplicaciones, suplir parte (a veces pequeña) de la necesidad total de nutrientes de la cosecha por aspersiones nutricionales. El resto tiene que ser absorbido por las raíces.

La mayor eficacia en la absorción foliar de nutrientes a menudo se registra durante la noche, en contraste con las horas de día, bajo condiciones de alta humedad y temperatura, en contraste con humedad y temperatura bajas, y por el empleo de conductores higroscópicos o aditivos, en contraste con aquellos que no retienen la humedad. El fósforo y el ácido ortofosfórico (pH 2.0-2.5) son absorbidos por las hojas más efectivamente.

La mayoría de las formulaciones de fertilizante líquido completo pueden ser aplicadas al follaje de las plantas a razón de un galón en 100 galones de agua; las formulaciones de sal seca soluble a razón de 4 a 6 libras en 100 galones de agua. Estas concentraciones pueden ser aumentadas diez veces, si son aplicadas como aspersiones a las frutas retardadas latentes en los árboles. Para cosechas tempranas transplantadas y para cosechas vegetales y frutales durante la florescencia y formación de la fruta, se recomienda una razón de 1:2:1, mientras que una razón de 1:1:1 se considera mejor para promover buen desarrollo vegetativo.

■

Progreso en la Represión de Maleza en Puerto Rico

Nogueras, LUCE & COMPANY; P. CARRERAS, Central Merdedita; CARDONA, COMUNIDAD AGRICOLA; y F. DUPRE, Aviador Particular. *Informe presentado en la Reunión de la Asociación de Técnicos Azucareros de Puerto Rico, Diciembre de 1959.*

Tal como lo hicieron la mayoría de países productores de azúcar, Puerto Rico comenzó a usar los herbicidas de contacto hace unos doce años. Este sistema encontró fuerte oposición, por cuanto vino a desplazar gran número de trabadores durante la época de tiempo muerto. Por otra parte, con las fuertes aspersiones de arsénico empleadas al principio, ocurrieron ciertos acidentes apenas justificados, los que fueron atribuídos mayormente al sistema. Con el empleo de substancias menos tóxicas, la segunda dificultad fue eliminada, pero la oposición inicial continuó. Con el aumento en la migración de trabajadores, la fuerza de brazos disponible para los trabajos de campo quedó reducida, lo que influyó en la aceptación general del uso de herbicidas químicos.

Al quedar aceptado el empleo de herbicidas de contacto, se iniciaron las aplicaciones de herbicidas a mano antes de la germinación. En este caso, las aplicaciones de 2-4D ocasionaron dificultades entre los agricultores de cosechas susceptibles de ser dañadas por esta substancia. Esta dificultad ha sido mayormente eliminada con el empleo de substancias más fáciles de controlar. Año tras año se fue adoptando el sistema menos laborioso de hacer las aplicaciones de herbicidas por aeroplano, a fin de establecer un régimen de aplicación más oportuno, lo que resulta esencial para el éxito de este sistema. Actualmente existen tres empresas de aviones en Puerto Rico dedicadas a este servicio, el que están ampliando continuamente.

El gobierno de Puerto Rico ha establecido un sistema especial para atender las reclamaciones de demandantes. Este asunto es tratado en un informe aparte presentado por un piloto de avión local.

■

Prácticas de Conservación para Tractores y Equipo General

W. NELTHROPP y F. H. GRAY, *Informe presentado en la Reunión de la Asociación de Técnicos Azucareros de Puerto Rico, Diciembre de 1959.*

El sistema de conservación y desarrollo de maquinaria seguido en la plantación de Luce & Company se describe en tres partes:

(1) El objeto en el primer caso consiste principalmente en cuidar y conservar el equipo en buen estado a fin de evitar o reducir al mínimo la posibilidad de fallas o averías. Esto también incluye el entrenamiento y empleo de personal para operar el equipo.

(2) La segunda fase corresponde a la categoría de reparaciones. Esto incluye traer las piezas de equipo del campo al taller central de reparaciones, limpiarlas, desarmarlas, examinarlas, volverlas a armar probarlas y devolverlas al servicio.

(3) La tercera fase trata brevemente del estudio, desarrollo y pruebas de nuevos tipos de maquinaria agrícola y de su adaptación a las necesidades del momento.

■

Estudios de Tiempo y Movimiento Aplicados en el Control de Yerba con Productos Químicos

EXIO MEJIA, *Informe presentado en la Reunión de la Asociación de Técnicos Azucareros de Puerto Rico, Diciembre de 1959.*

Una de las operaciones más importantes en el cultivo de la caña es el control de los yerbajos con productos químicos. En la actualidad encontramos dificultad en conseguir personal que realice este tipo de trabajo. Se ha recurrido a la aplicación aérea del producto para ayudar en parte a resolver el problema obrero. Ésta, sin embargo, está limitada a cierto aspecto, ya que los yerbicidas de contacto no se pueden regar con avión. El uso del avión sólo es aconsejable en la aplicación de insecticidas y yerbicidas pre-germinativos. El costo del producto sube año tras año y hay que tener un buen control en el uso del mismo para evitar gastos innecesarios.

Estudios de tiempo y movimiento hechos con el propósito de desarrollar un plan de incentivo con miras ha proporcionar un mejor ingreso al obrero, para estimular a éste a realizar este tipo de trabajo ha ayudado en parte a resolver la escasez de

personal. También haciendo uso de estos estudios se ha podido diseñar un buen sistema de control del producto abaratando en esta forma el costo de la aplicación.

Algunos de los factores más importantes tomados en consideración para hacer los estudios son: la altura de la caña, el por ciento de terreno cubierto por yerbas, el tipo de yerbaje, la topografía y como en todo estudio de Tiempo y Movimiento la fatiga física ocasionada durante el trabajo.

El equipo a usarse tanto para la protección del obrero como el necesario para llevar a cabo la operación debe de ser de la mejor calidad y estar en buenas condiciones de uso.

Los Standards fueron desarrolladas a base de minutos standard por galón de líquido en solución regado. Con este sistema hay que medir la cantidad de líquido en solución que riega cada hombre.

Al finalizar la jornada de trabajo se sabrá el número de galones regados por cada obrero. Aplicando los standards para cada galón regado, bajo las diferentes condiciones que prevalecen, se determina el incentivo a pagar a cada obrero. Es bueno recordar que cada trabajador tiene su jornal mínimo garantizado.

Sumando el total de galones regados por el grupo y sabiendo el cuerdaje regado durante el día, podemos saber la aplicación de líquido por cuerda.

Esta aplicación de galones por cuerda debe ser la deseada para matar los yerbajos previamente observados en una inspección del campo.

■

Emplea de Raedoras de Rastrojos en Puerto Rico

Ponentes: T. SUAREZ, D. SERRANO, y N. CARDONA, *Informe presentado en la Reunión de la Asociación de Técnicos Azucareros de Puerto Rico, Diciembre de 1959.*

La Luce & Company al sur de Puerto Rico adoptó la práctica de raer los rastrojos de caña hace cinco años con el objeto de facilitar y acelerar los trabajos de riego en los cañaverales de retoño. La máquina usada para este fin es del tipo de hojas no giratorias, la que realiza un trabajo satisfactorio, pero el costo de conservar las hojas bien afiladas resulta elevado. Se ha observado que la raedura de los rastrojos hace que las cepas de caña retoñen mejor. También se observó que cuando las cuchillas necesitan afilar y cortan mal, hay que hacer más replantes. Se han probado raedoras de rastrojos mecánicas, pero la cantidad de fuerza que se necesita para operarlas, las hace impráctica.

En regiones que siguen el sistema de Louisiana modificado, se ha adoptado el tipo de raedora de norma en Louisiana. En la mayoría de casos, éstas tuvieron que ser reforzadas para que pudiesen resistir el servicio más severo encontrado en Puerto Rico. Los resultados obtenidos en cañaverales preparados de esta manera han sido buenos, por lo que se piensa extender la misma práctica a toda la región sembrada por el sistema de Louisiana modificado.

■

Alimentación de Caña Automática

EMILIO MORALES, *Informe presentado en la Reunión de la Asociación de Técnicos Azucareros de Puerto Rico, Diciembre de 1959.*

El sistema de alimentación automática en servicio en el Central Igualdad durante las últimas dos campañas mejoró el trabajo de los molinos y aumentó en 15% la capacidad de molienda.

El sistema consta de una combinación de aparatos hidráulicos y electromáticos que regulan la alimentación a las cuchillas de caña, desmenuzadoras y molinos. Un rodillo de alimentación flotante regula la alimentación a las desmenuzadores, al regular la velocidad del transportador de caña. En casos de sobrecarga en las cuchillas, tal circunstancia es transmitida al tablero de mandos, el cual reduce la velocidad de todo el tren de molienda. En casos de atascamiento, cada molino para por falta de material. Cuando el molino para por falta de caña, cada estación se inmoviliza por falta de material.

El informe describe en detalle el trabajo que culminó en el desarrollo de este sistema.

■

Servicio a los Productores de Caña en el Central Plata

GUILLERMO ESTEVES, JR., *Trabajo presentado en la Reunión de la Asociación de Técnicos Azucareros de Puerto Rico, Diciembre de 1959.*

La baja en los rendimientos de caña por hectárea en la región de San Sebastián, causada indirectamente por el establecimiento del sistema de cuotas en Puerto Rico, hizo evidente la necesidad de iniciar un programa para elevar los rendimientos. Como la mayoría de productores no podía acometer la tarea de renovar sus plantaciones, en noviembre de 1955 se creó una División de Servicio a los Productores con el fin de facilitarles lo necesario.

Aunque este Servicio a Productores funciona como una División del Departamento de Agricultura, cuenta con su propio personal y equipo. Al presente, los servicios ofrecidos son: (1) Preparación de tierras para nuevas siembras; (2) pruebas de variedades de caña y recomendación de nuevas variedades; (3) suministro de semilla de variedades comerciales a un costo módico; (4) consejo técnico sobre el empleo de abonos y productos químicos, y el suministro de los mismos a un costo módico; (5) la mejora de prácticas agrícolas establecidas; (6) la evolución e introducción de nuevas prácticas adaptadas a las condiciones locales; y (7) préstamos de largo plazo sobre nuevas siembras a bajos tipos de interés, en conjunción con el financiamiento de la cosecha de cana de retoño actual.

■

Grupo Fabril

Experiencia Riego Yerbicida por Avión

Nogueras, LUCE & CO.; CARRERAS, Central Mercedita; CARDONA, COMUNIDAD AGRICOLA BIANCHI y FRANK DUPRE, Aviador Particular, *Informe presentado en la Reunión de la Asociación de Técnicos Azucareros de Puerto Rico, Diciembre de 1959.*

El el 1954, debido a la escasez de brazos, recurrimos al riego de yerbicida por avión. Los buenos resultados, tanto en la erradicación de yerbajos como en los bajos costos, nos llevaron a continuar usando el avión. Estos resultados pueden ser atribuidos a lo siguiente:

1. Experiendia y responsabilidad de los pilotos.
2. Pista cerca (Callejón adecuado de la finca) de los sitios a regar.
3. Concentraciones confiables.
4. Control rápido de yerbajos.
5. Mayor control sobre riego de yerbicidas por parte del agricultor.

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La poca altura de la masacocida, amplio tubo de bajada y distribución uniforme del vapor permiten rápida circulación. Esto asegura cristales bien formados, ausencia de grano falso y el mínimo de conglomerados.

Cuando Piense en Maquinaria Azucarera, Acuérdese de FLETCHER

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Progreso Mediante el Estudio

ARTURO RIOLLANO, *Trabajo presentado en la Reunión de la Asociación de Técnicos Azucareros de Puerto Rico, Diciembre de 1959.*

En la Estación Experimental Agrícola de la Universidad de Puerto Rico se está llevando a cabo una serie de estudios sobre varias fases del cultivo de la caña de azúcar y programa de industrialización. Estos estudios prosiguen la evolución de una serie de programas o proyectos que abarcan, entre otras cosas, lo que sigue: Propagación de nuevas variedades de caña; mecanización de los trabajos de recolección y carga de la caña; determinación de métodos de abonamiento; diagnosis foliar; empleo de fósforo radioactivo; trabajos de riego y remoción de hojarasca; determinación de los factores que afectan el contenido sacaroso; estudios sobre las enfermedades de las rayas cloróticas y raquitismo de la caña; represión de insectos y nemátodos; producción y refinación de azúcar por el proceso de intercambio iónico. También se están llevando a cabo varios estudios sobre la utilización de subproductos como torta de filtro y miel final. Los estudios sobre la producción de ron incluyen los procesos de fermentación y destilación así como el establecimiento de normas de calidad.

■

Experimentos con Separan A-30 y Bentonita en el Central Guánica

ROBERTO RAMIREZ, *Trabajo presentado en la Reunión de la Asociación de Técnicos Azucareros de Puerto Rico, Diciembre de 1959.*

En el Central Guánica se llevó a cabo una serie de ensayos con Separan A-30 y Bentonita encaminados a mejorar la clarificación de jugos de caña. Los resultados inconclusivos de estos ensayos parecen indicar que con el producto Separan se obtiene mejor sedimentación y menor volumen de cachaza.

Se observó que las cantidades tanto de Separan como de Bentonita empleadas deben ser exactas, y que para lograr los mejores resultados, deben ser precisamente reguladas.

■

Construcción Mejorada de las Hojas de Cuchillas de Caña Giratorias

J. A. LOMBA, *Trabajo presentado en la Reunión de la Asociación de Técnicos Azucareros de Puerto Rico, Diciembre de 1959.*

Debido a la gran cantidad de materia extraña, como piedras, raíces de caña, fragmentos de hierro, etc., traída a la fábrica con la caña, fue necesario construir las hojas de las cuchillas de caña de un material que resistiese el impacto de esta materia al pasar por las cuchillas y que fuese resistente al desgaste al mismo tiempo.

Al principio se construyeron hojas de aceros de aleación especiales, las que resultaron ser resistentes al desgaste pero que no presentaban suficiente resistencia al impacto de piedras, etc.

Subsiguientemente, las hojas se hicieron de acero dulce ordinario, con filos duros soldados en los lados cortantes. Este tipo de construcción resultó ser muy satisfactorio contra el impacto y el desgaste, pero imponía mayor carga al motor transmisor. La modificación de las cuchillas tipo "Machete", haciendo los extremos de las hojas cuadrados, redujo considerablemente el costo de las hojas y la potencia requerida del motor transmisor.

Este tipo de hoja se usó con muy buenos resultados en las cuchillas tipo Machete y en las cuchillas de paso reducido en el Central San Vicente durante las campañas de 1957 y 1958.

También fue necesario cambiar el material empleado en los pernos de sujeción de las hojas al eje, a fin de obtener los mejores resultados con este tipo de hoja, ya que esto resultaba ser su punto débil.

Se lograron importantes economías tanto en la construcción de las hojas como en la operación durante la campaña de las cuchillas giratorias provistas de hojas de este tipo. El costo de las hojas tipo Machete fue reducido aproximadamente a la mitad, y el de las cuchillas de paso reducido aproximadamente a un tercio. No fue necesario afilar las hojas durante la campaña, y solamente se cambiaron las hojas torcidas o deformadas durante los paros a fin de semana, cuando también se cambiaron los pernos debilitados.

■

El Proceso Elguanite en el Central Cortada

MIGUEL BALLASTER, *Trabajo presentato en la Reunión de la Asociación de Técnicos Azucareros de Puerto Rico, Diciembre de 1959.*

El Proceso Elguanite de Clarificación de Jugo Selectiva fue probado en el Central Cortada, Santa Isabel, Puerto Rico, durante la campaña de 1959, donde pudimos duplicar los resultados obtenidos en el Central Machete durante la campaña de 1958 (véase SUGAR y AZUCAR, Tomo 54, No. 7, Julio 1959, págs. 17-18 y 43, 51), y hemos observado lo siguiente:

(1) En el tratamiento de jugos limpios por el proceso Elguanite se requiere menos material para obtener los mismos resultados.

(2) Aunque Elguanite no se usa como un agente clarificante, su empleo en este central resultó beneficioso en el caso de jugos que contienen partículas finas de impurezas en suspensión.

(3) La acción floculante del producto Separan AP-30 es acelerada cuando se usa en jugos tratados con Elguanite en vez de cal.

(4) Por el proceso Elguanite, la pureza de la miel final bajó seis puntos.

(5) Los jugos tratados con Elguanite producen mieles que facilitan la inyección de semilla y la cochura.

(6) Con el empleo de Elguanite como un preservativo, la remoción total de jugos en vías de tratamiento durante períodos de mal tiempo fue reducida de cuatro veces al año a ninguna. Los jugos detenidos hasta 58 horas apenas acusan pérdida alguna por inversión.

■

Limpieza de la Caña en el Central Cortada

Por CENTRAL CORTADA LA GERENCIA, *Trabajo presentado en la Reunión de la Asociación de Técnicos Azucareros de Puerto Rico, Diciembre de 1959.*

El Central Cortada fue el primer ingenio en Puerto Rico que comenzó a recibir cañas recogidas a máquina. Durante la campaña de 1953, aproximadamente el 50% de la caña recibida fue cargada a máquina y el otro 50% a mano. Inmediatamente comenzaron a registrarse dificultades, tanto en los molinos como en el departamento de elaboración. Siendo este el primer año de recolección por este sistema, la fábrica recibió gran cantidad

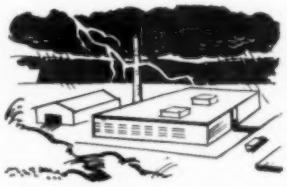
(Sigue en la página 112)

la rapidez del servicio reduce la duración de un paro

UN GENERADOR DAÑADO POR UN RAYO VUELVE A FUNCIONAR A LOS 46 DIAS GRACIAS A LOS SERVICIOS DE LA INTERNATIONAL GENERAL ELECTRIC

Uno de los mayores problemas actuales de la industria es el de obtener servicio de reparaciones e información técnica para su equipo eléctrico. Los siguientes hechos constituyen un ejemplo típico de la forma en que el competente personal técnico de la General Electric puede proporcionarle información en cualquier parte del mundo sobre la reparación y mantenimiento de los productos G.E.

5 de octubre—La oficina central de la I.G.E., en Nueva York, recibe una llamada urgente informándole que ha caído un rayo en una planta del Caribe y que un generador G-E tipo ATI-24 de 400KVA ha sufrido daños de importancia.

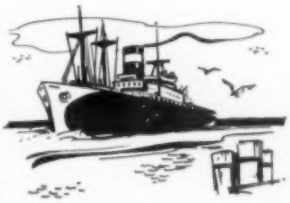


(El mismo día)—La oficina de Nueva York envía un pedido urgente al Departamento de Grandes Motores y Generadores de la G.E. para la provisión de un juego completo de bobinas para el estator y de los demás materiales necesarios para su instalación en el generador dañado.

6 de octubre—El cliente envía un cablegrama solicitando aislamiento especial resistente a la humedad y al calor y bobinas para 2400/4160 Voltios. El nuevo pedido requiere trabajos especiales de diseño y tratamiento especial. Este trabajo podría demorar el despacho programado de 4 a 6 semanas.

15-29 de octubre—La oficina de Nueva York redacta instrucciones especiales para la reparación del generador para los técnicos del cliente, y le hace saber que un ingeniero de uno de los talleres de servicio de la G.E. en los E.U. que se encuentra realizando trabajos en otras instalaciones cerca de la planta podría efectuar el trabajo. El cliente acepta la propuesta, y la oficina de Nueva York da las instrucciones correspondientes al ingeniero.

1° de noviembre—Las bobinas y el material para los arrollamientos salen del Departamento de Grandes Motores y Generadores de la G.E. y son despachados por vía marítima. El material pudo ser despachado por dicha vía, que es más económica, gracias al pronto despacho desde el taller de la G.E.



7 de noviembre—La oficina de Nueva York envía al ingeniero del taller de servicio las instrucciones completas para el rebobinado del generador.

12 de noviembre—El ingeniero del taller de servicio llega a la planta del cliente.

13 de noviembre—Llega el material para el generador dañado.

19 de noviembre—El ingeniero del taller de servicio de la G.E. completa el rebobinado y somete el generador a un ensayo de funcionamiento.

20 de noviembre—El generador, reparado completamente, está listo para funcionar. ¡Sólo fueron necesarias 6 semanas para ponerlo nuevamente en servicio!

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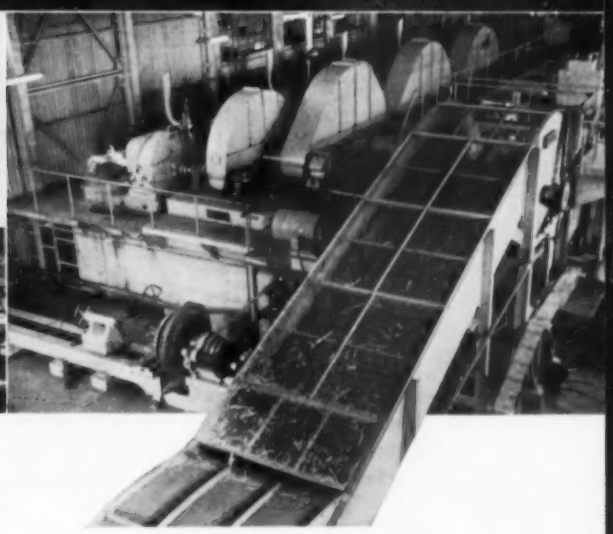
SQUIER

Maquinaria para el Manejo de la Caña



MANEJO CORRECTO DE LA CANA... EL PRIMER PASO HACIA UNA MOLIENDA EFECTIVA

No permita Ud. que el uso de equipo viejo e ineficiente en el manejo de la caña impida el buen funcionamiento de su molienda. SQUIER ofrece el equipo más moderno para dicha operación, equipo que incluye:

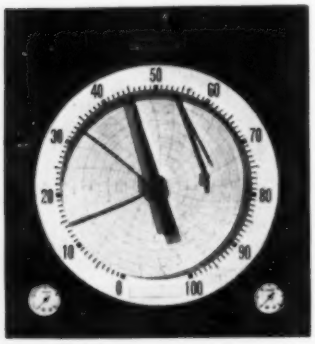
- Mesa de Alimentación
- Volcador
- Conductor Auxiliar de Caña
- Conductor Principal de Caña
- Nivelador
- Cuchillas Cañeras

Toda Maquinaria Azucarera SQUIER por más de un siglo se ha fabricado según normas de la más alta calidad. Hemos sido los iniciadores de diseños avanzados que incluyen maquinaria tal como el Trapiche de Tensión Triangular patentado por SQUIER.

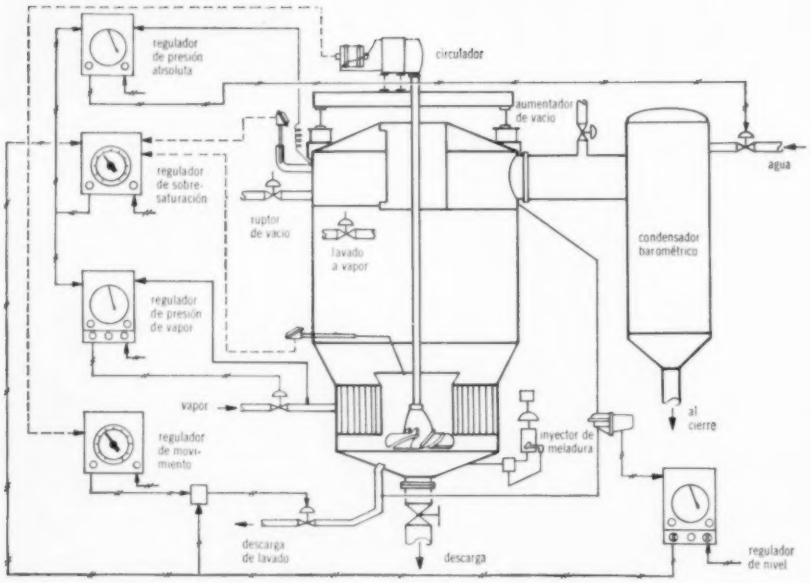
Permita Ud. que Squier le diseñe un sistema moderno para el manejo de la caña, para asegurar la debida alimentación de caña a su tandem. Escriba hoy mismo solicitando información sobre la manera en que SQUIER podrá modernizarle esta importante fase de sus operaciones.

THE SQUIER CORP.
INGENIEROS Y FABRICANTES
BUFFALO, NEW YORK, U.S.A.

La secuencia del proceso se ajusta de modo que tan pronto como se obtiene el máximo rendimiento de una etapa, inmediatamente comienza la etapa siguiente automáticamente para el máximo de eficiencia y economía.



Regulador-registrador de sobresaturación



El sistema Honeywell automático para tachos al vacío asegura el desarrollo uniforme de cristales

AUMENTA EL RENDIMIENTO • ECONOMIZA VAPOR • REQUIERE POCA ATENCION

Este nuevo sistema Honeywell mide exacta y directamente el grado de sobresaturación de la solución de azúcar en el tacho al vacío. Regula la temperatura y la presión absoluta de la solución y la velocidad de alimentación . . . y produce el número y tamaño de cristales deseados, sin cristales indeseados ni "grano falso".

Este sistema consta de cuatro circuitos reguladores interactivos, con el regulador-registrador de sobresaturación como el componente básico. Este instrumento mide la sobresaturación en términos de presión y temperatura y compensa el aumento en el punto de ebullición y pureza de la solución.

Los valores de las variantes elegidas dependen de las características del tacho al vacío y del método preferido por el productor. Una vez determinados estos valores, se comienza el proceso oprimiendo un botón de contacto. La solución puede ser repasada automaticamente, si se desea. Durante el período inicial de cochura, la razón de aumento en sobresaturación se regula por un instrumento que mide la sobresaturación según se ilustra en el gráfico y envía una señal al elemento fijador de valores de un regulador de presión absoluta y a un regulador de presión de vapor.

Cuando se llega al punto de inyectar la semilla, el regulador-registrador de sobresaturación alimenta al tacho automáticamente una cantidad de semilla determinada, y la presión absoluta o la temperatura son entonces variadas para ayudar a establecer el tamaño del grano. Entonces, la presión y admisión de vapor se mantienen constantes, y el desarrollo de cristales se ajusta por un regulador de movimiento.

El ingeniero regional de Honeywell en su comarca le puede dar datos completos sobre el sistema de regulación para tachos al vacío y sobre cómo aplicarlo a su proceso. Comuníquese con él hoy mismo . . . quien se encuentra tan cerca como su teléfono.

MINNEAPOLIS-HONEYWELL, Wayne & Windrim Avenues, Philadelphia 44, Pa., E.U.A.

Honeywell

H HONEYWELL *First in Control*

¡Los vehículos 'Jeep' ayudan en todo el mundo!

en el cañaveral... Los dueños de ingenios azucareros utilizan vehículos 'Jeep' para distribuir su costo entre muchas tareas y aumentar sus utilidades. Con sus tres puntos de toma de potencia, suministran fuerza móvil para operar huinches, generadores, maquinaria impulsada a correa y muchos otros accesorios. Los vehículos 'Jeep' son de diseño *funcional* y están hechos especialmente para cada tipo de tarea, en o fuera del camino. La tracción extra del 'Jeep' de propulsión en las 4 ruedas le lleva a usted y a su carga útil a *dondequiera, siempre,* por empinadas laderas, por densa vegetación y por rudos caminos con profundos baches y lodazales.

WILLYS-OVERLAND EXPORT CORPORATION

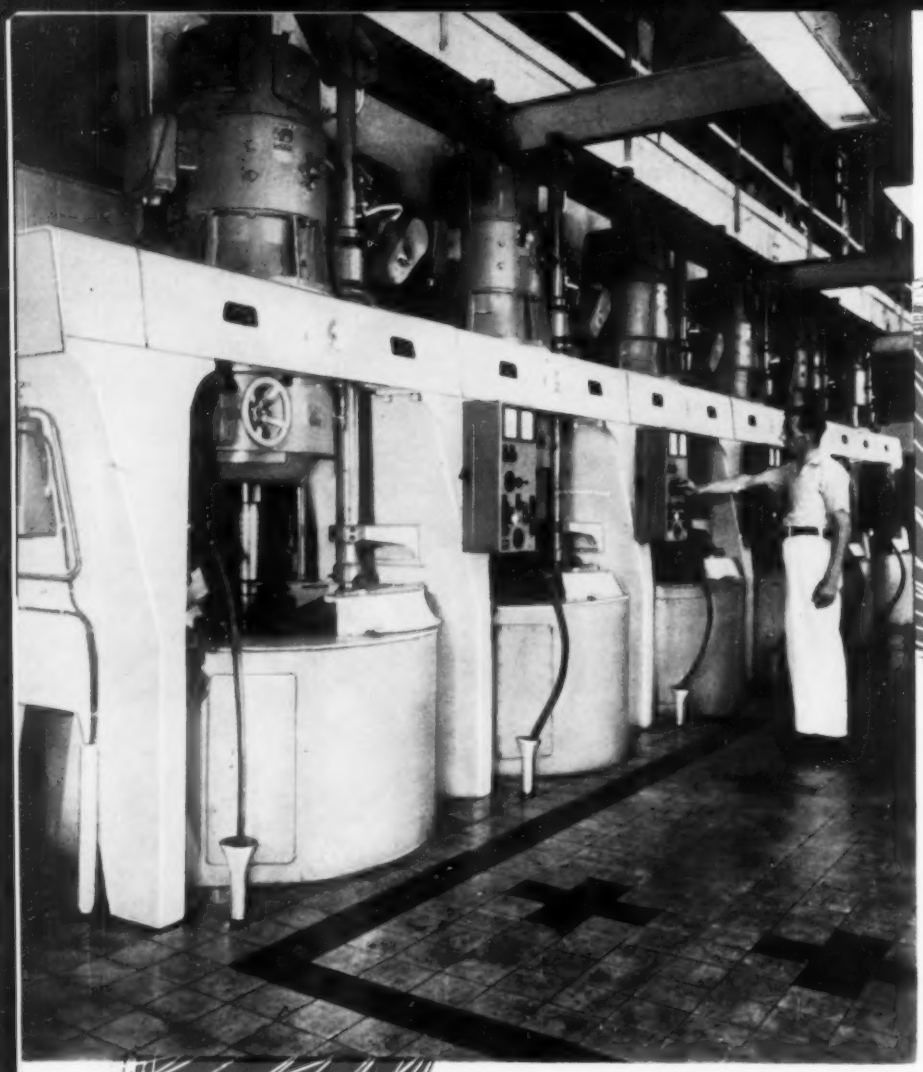
TOLEDO 1, OHIO, E.U.A.

... miembro de las crecientes INDUSTRIAS KAISER

la familia 'Jeep'-Línea Equilibrada de vehículos propulsión a 4 ruedas

'Jeep' Universal — 'Jeep' Utility Wagon — Camión 'Jeep' — 'Jeep' Forward Control FC-170

"los vehículos más útiles del mundo"



Una batería de centrífugas completamente automáticas en la Irish Sugar, Carlow, Irlanda.

En fábricas y refinerías de azúcar de remolacha y de caña siempre se observa la tendencia hacia la modificación del proceso de elaboración a fin de obtener cada vez mayor continuidad. Para llevar aún más lejos este principio, la ASEA-Landsverk presenta—

La Centrífuga Completamente Automática

con Transmisión Leonard

Esta centrífuga presenta las mismas ventajas que la máquina de marcha continua y velocidad constante, en lo que se refiere al bajo consumo de energía y al bajo costo de conservación.

SUS PRINCIPALES CARACTÉRISTICAS SON:

Diseño Aerodinámico

Velocidades Variables, Máxima y de Carga

Frenaje Regenerativo Completamente Eléctrico

No Ocurren Picos de Carga

Mecanismo de Carga Neumáticamente Accionado

Descargador Accionado por Motor

Sincronización Automática Centralizada

Propia para Azúcar de Todas Clases

Contamos con representantes y facilidades de servicio en casi todos los países productores de azúcar.

Para mayor información diríjanse a la oficina de la ASEA más cercana, o directamente a:

ASEA

Västerås, Suecia

NICHOLS

HORNOS

HERRESHOFF®

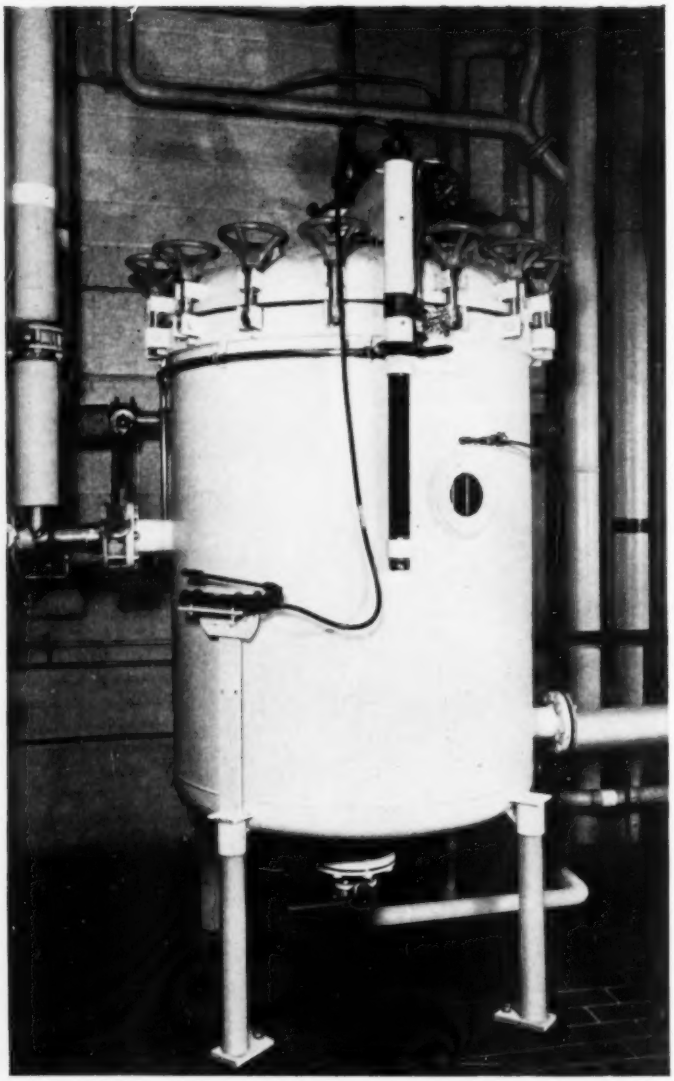
para generaciones granulares adsorbentes

Un solo Herreshoff al aire libre para carbón vegetal y/o animal—una sala de filtros a carbón limpia, moderna—menos carbón por ciento azúcar—menos inversión de capital.

Nichols Engineering & Research Corporation

70 Pine Street, New York 5, N. Y.

3513 N. Hovey St., Indianapolis 18, Ind.
405 Montgomery St., San Francisco 4, Calif.
1477 Sherbrooke St. W., Montreal 25, Canada



distintivos especiales sin costo adicional

Salidas individuales en las hojas (opcionales) con cierres en cada hoja, que ofrecen perfecta regulación de la claridad.

Deflectores en las entradas que distribuyen el líquido uniformemente, reducen al mínimo el asiento de los sólidos, y elevan la eficiencia.

Boquillas de tipo especial en las salidas de las hojas, que aseguran altos regímens de flujo.

Levantador de la tapa (hidráulico o manual) exactamente centrado, que asegura perfecto asiento de la junta cuando se cierra la tapa.

Ruedas de mano y pernos de sujeción con roscas de 29°, que facilitan su manejo y ofrecen máxima seguridad.

Desalojador Hydro-Jet que limpia las hojas sin abrir el filtro, reduce el tiempo muerto, y hace el trabajo de filtración prácticamente continuo.

PERFECTA CLARIDAD

PARA LA CANADA & DOMINION SUGAR CO. Ltd.

La calidad final del azúcar líquido entregado al consumidor depende directamente del trabajo de este filtro final—una razón lógica para insistir en un Angola. Después de la filtración, el azúcar líquido claro es enviado a los tanques de depósito, listo para ser entregado por camiones-tanques.

Para todo lo referente a filtración, a usted le convendría solicitar la ayuda técnica y cotizaciones de Durco-Enzinger. Pida el catálogo EF/2.

FILTROS ANGOLA

ENZINGER FILTER DIVISION, THE DURIRON COMPANY, INC., Dayton, Ohio, E.U.A.

La "magia" de la filtración con Celite pone en el azúcar un resplandor adicional

¿A qué se debe esa *mágica* actuación de CELITE como ayuda de filtro? CELITE* es un polvo hecho de millones de partículas de formas irregulares, intrincadas, que no son otra cosa sino las caparazones de plantas marinas monocelulares extintas desde hace millones de años (florecieron en el Mioceno). La ciencia ha descubierto que esta "tierra blanca" forma una superficie ideal de filtración, más fina que la de cualquier tela de filtro. Y son *milagros* los que hoy realizan en muchos procedimientos industriales estos polvos silicosos conocidos por CELITE.

Como ayuda de filtro, por ejemplo, CELITE se usa en la filtración de jarabes de caña de azúcar, cerveza, agua potable, productos farmacéuticos y muchos otros cuerpos y substancias que se emplean diariamente. Y ¡ningún otro medio de filtración puede compararse en eficacia con CELITE!

CELITE está a la venta en nueve grados de norma, cada uno de los cuales se elabora para diferentes requisitos industriales: *Filter-Cel*, pongamos por caso, para máxima clarificación; o CELITE 545, para índices rápidos de flujo. Y Ud. puede obtenerlo en grados *especiales*, para establecer el equilibrio preciso entre la claridad y el índice de flujo que necesite . . . Otra ventaja importante: *Cada* carga de CELITE que Ud. ordena es uniforme, ya que *cada* kilo se elabora escrupulosamente, en la misma planta y en idénticas condiciones, ¡lo que garantiza un rango definido!

Pida Ud. un útil folleto sobre CELITE a Johns-Manville International Corp., Box 14, New York, N.Y., EE.UU.

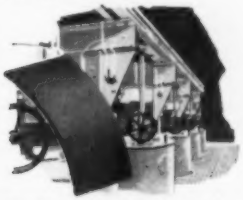
*Marca registrada en muchos países por Johns-Manville

JOHNS-MANVILLE
INTERNATIONAL CORPORATION

JOHNS-MANVILLE JM PRODUCTS

El distribuidor J-M local le dará detalles sobre estas otras importantes ayudas industriales:

Empaquetaduras resistentes para vástagos de superior calidad. Son eficaces en servicio alterno, aun en las condiciones más adversas. Exija empaquetaduras de fibra de amianto J-M: su lubricación es excelente y, para los émbolos y vástagos macizos significan fricción mínima.



Para frenaje seguro de máquinas centrífugas y otras máquinas de movimiento rotativo, investigue Ud. las múltiples ventajas de los Materiales de Fricción Johns-Manville: son de confianza; duran más.

Para simplificar moldeables fraguados de formas especiales, use Refractarios *Firecrete** J-M. Basta mezclar *Firecrete* con agua, en moldes de madera o metal, y las piezas fundidas se pueden usar dentro de 24 horas.

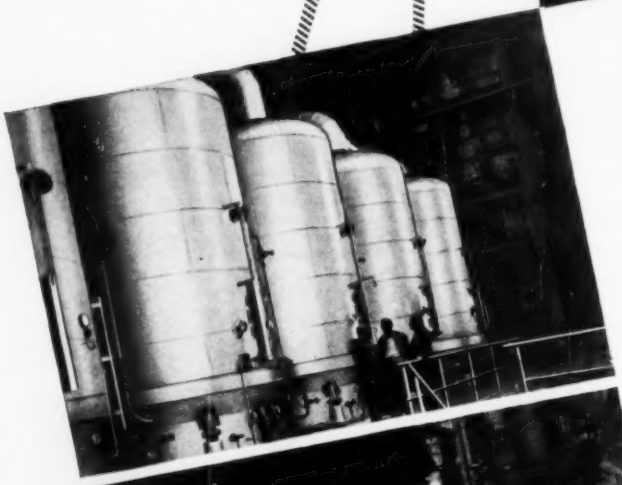
Aislamiento superior para tuberías industriales, calentadas de 40° a 650° C . . . Especifique Ud. *Thermobestos**. Su aplicación es muy fácil, y aísla en forma realmente eficaz: Ud., puede confiar en *Thermobestos*.

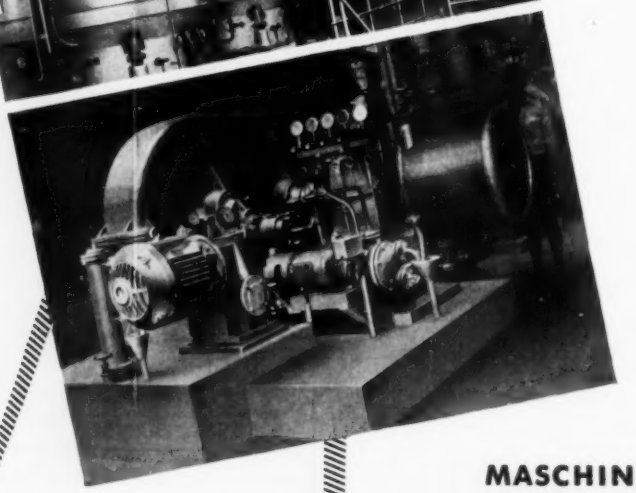
Johns-Manville
Box 60, New York 16, N. Y., EE.UU.
Sírvanse enviarme literatura acerca de:
- ☐ Celite
- ☐ Empaquetaduras para émbolos y vástagos
- ☐ Materiales Industriales de Fricción J-M
- ☐ Refractarios Firecrete J-M
- ☐ Aislamientos Thermobestos J-M

Nombre_____
Dirección_____
Ciudad_____
País_____

INGENIOS COMPLETOS

INCLUSO
INSTALACIONES PARA CUADRADILLOS Y PILONES DE AZUCAR





para la fabricación de azúcar de caña hasta el azúcar refinado de primera clase.

Sobre la base del desarrollo más moderno de la técnica azucarera transformamos instalaciones de modelo anticuado en tales de máxima rentabilidad.

Instalaciones de trapiches con impulsión de grupos individuales. Especialmente transformación de trapiches aticuados. **Centrifugas** para azúcar blanco, azúcar crudo, productos medios y posteriores.

Filtros para todos los problemas de filtración.

Instalaciones secadoras para la industria azucarera.

Centrales de energia para todas presiones y capacidades.

Suministro de máquinas y aparatos singulares y construcción de ingenios completos también para la elaboración de remolachas.

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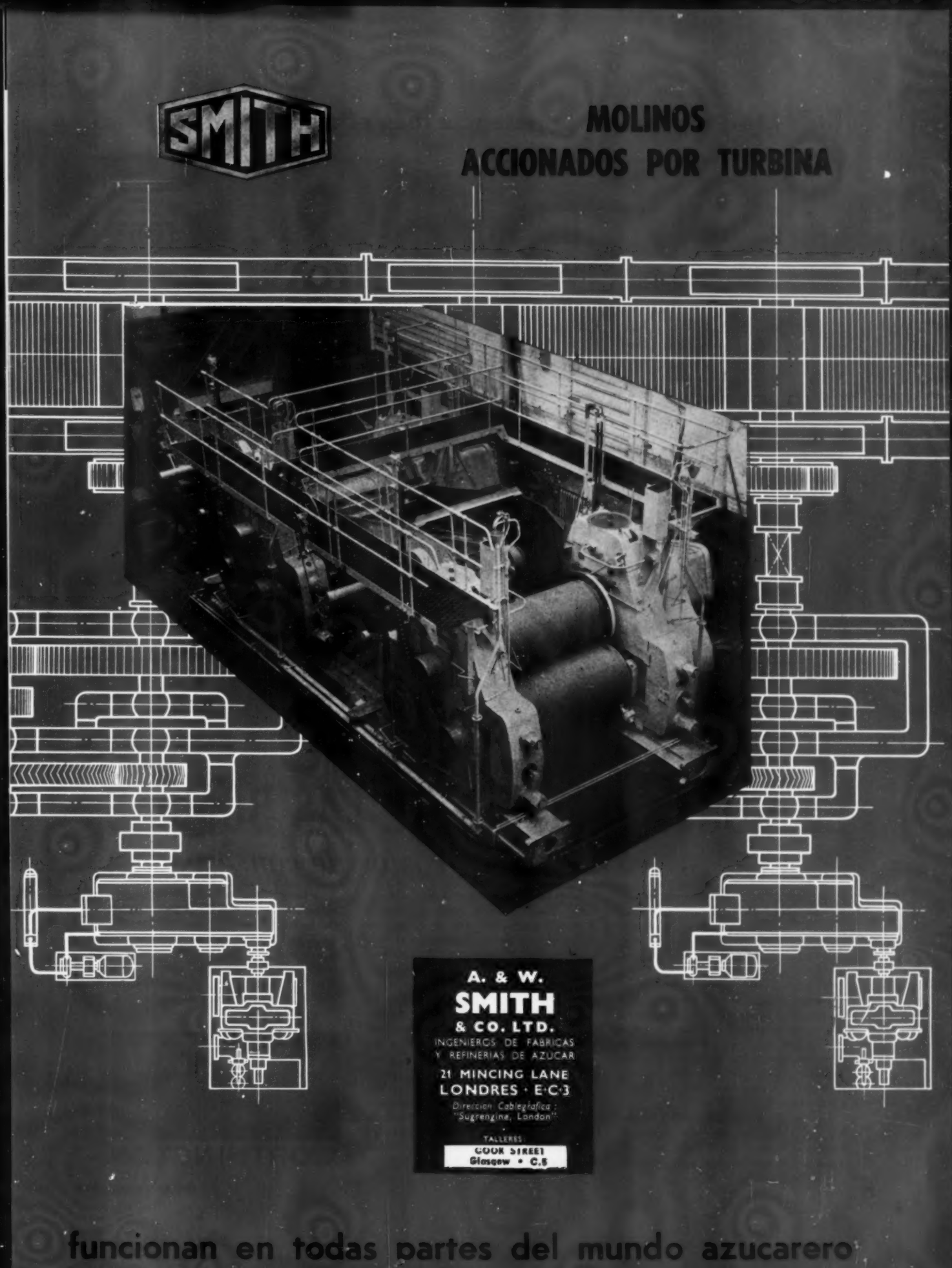
AKTIENGESELLSCHAFT · GREVENBROICH-NEUSS
(ALEMANIA OCCIDENTAL)

9068 s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funcionan en todas partes del mundo azucarero

Idea #3—Para utilizar la potencia más eficientemente

El trabajo de mantenimiento es más sencillo cuando se usa una línea de bombas normalizadas. Otras ventajas: inventarios más reducidos, cortos períodos de paralización.

LA NORMALIZACION DE LAS BOMBAS

ahorra en costos de conservación

Usted puede reducir el inventario de piezas hasta un 50% y simplificar grandemente el trabajo de mantenimiento, utilizando las bombas Worthington S.E.S.C. (bombas centrífugas normalizadas).

El período de paralización ocasionado por el trabajo de mantenimiento se reduce también considerablemente con estas bombas S.E.S.C., gracias a la rapidez con que el mecánico se familiariza con sus detalles de construcción. Todas las bombas de esta serie se fabrican conforme a un mismo diseño básico.

La serie completa de bombas S.E.S.C. consiste de seis tipos de bombas, todos adaptables a una transmisión motorizada, o por correa, o por turbina. Capacidades obtenibles: hasta de 2700 galones/minuto, y hasta para 550 pies de altura de elevación. Usted puede elegir el tipo de caja de prensaestopas, o el de mecanismo sellado. Pueden hacerse hasta 70.480 combinaciones de bombas, todas armadas de piezas normales en "stock", y todas listas para su despacho inmediato a precios de competencia. Usted aprovecha todas las ventajas de la serie S.E.S.C. sin sacrificar su adaptabilidad. Y como *las piezas*—no las bombas—son piezas normalizadas, usted puede materialmente construir una bomba "a la orden" para obtener exactamente las características precisas para cada trabajo particular de bombeo.

Solicite detalles completos sobre estas bombas S.E.S.C., y un ejemplar del boletín "Power Planning Guide" de Worthington, donde se describen nueve ideas sobre la utilización más eficiente de la potencia. Escriba a la Worthington Corporation, Depto. 108-13S, Harrison, New Jersey, U.S.A.

WORTHINGTON

De Cañaverales Lodosos a Carreteras en Tierra Alta . . .

Arrastra Cargas Pesadas

Sin Embragar, Cambiar de Marcha ni Parar

Tractor Case-o-matic Drive 800 de 50 c. de f. arrastrando grandes cargas de cañaveral en alta velocidad sin "desliz del embrague" ni cambiar de marcha.

El Tractor Case-o-matic DRIVE® 800

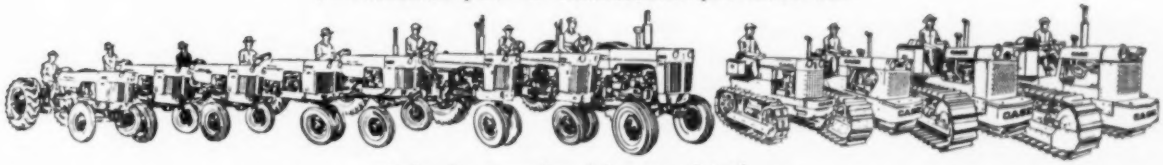
le ofrece hasta el Doble de Fuerza de Tiro

El tractor Case-o-matic Drive 800 arranca con cargas pesadas en alta velocidad . . . sale de cañaverales resbalosos fácil y rápidamente sin embragar, cambiar de marcha ni parar. El arrastre de carretas cargadas cuesta arriba se hace con seguridad, sin esfuerzo y sin peligro de parar. Usted puede acortar la marcha . . . parar . . . y arrancar otra vez sin cambiar de marcha. En labores pesadas, el tractor Case-o-matic Drive *palpa* la carga instantáneamente y con precisión . . . y aumenta la fuerza de tiro hasta el 100% automáticamente . . . sin embragar, cambiar de marcha ni parar.

Y para trabajos livianos usted tiene la transmisión directa a su mando.

RENGLON COMPLETO DE TRACTORES CASE, DE RUEDAS Y DE CARRILES

. . . Motores para el combustible que usted usa



Todas las consultas deben ser dirigidas a

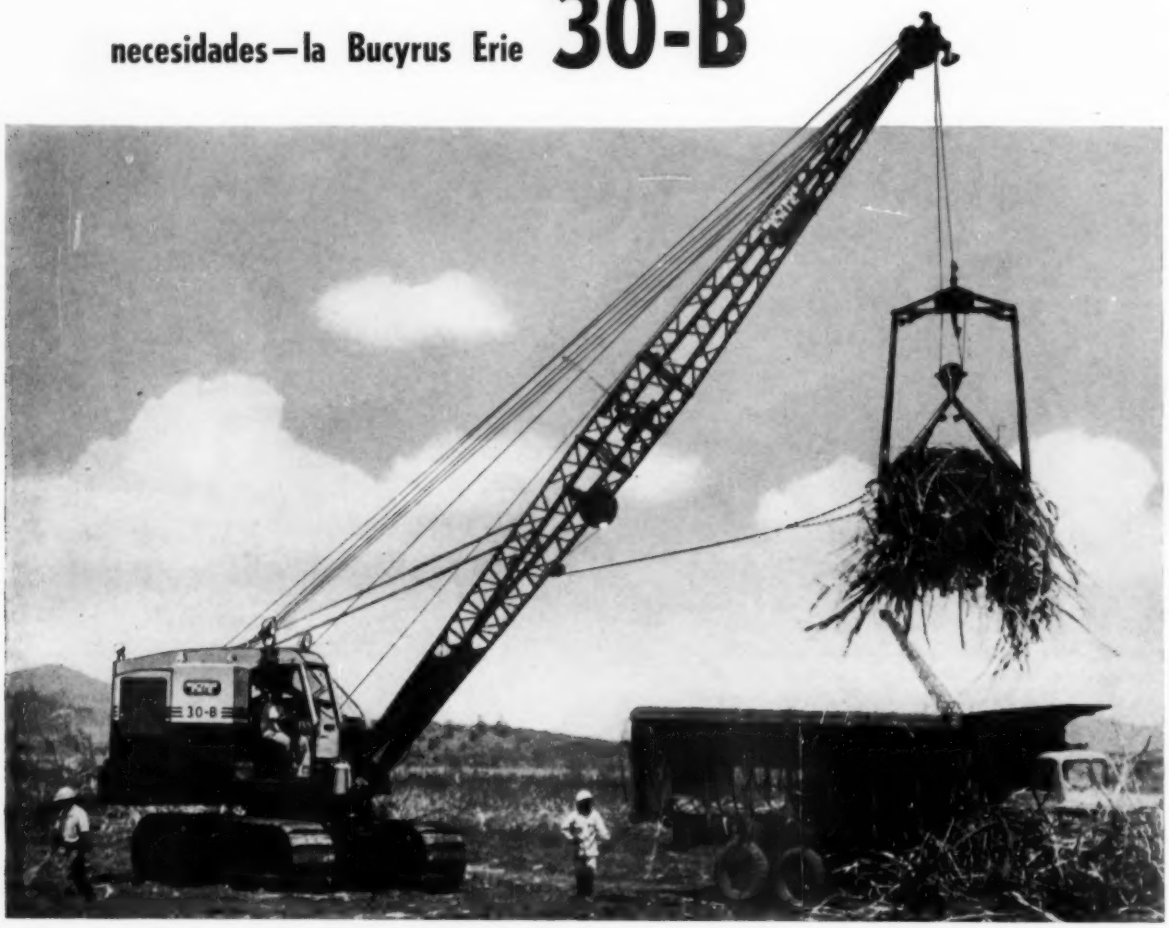
J. I. CASE INTERNATIONAL S. A.

P. O. Box 827, Nassau, Bahama Islands

Distribuidores de los productos fabricados por

J. I. CASE Company, 700 State Street, Racine, Wisconsin, E.U.A.

AHORA . . . una NUEVA CARGADORA DE CAÑA adaptada a sus necesidades—la Bucyrus Erie 30-B



Lo que usted venía esperando en cargadoras de caña desde hace años se ofrece ahora en la cargadora Bucyrus-Erie 30-B completamente nueva. Esta es la máquina que usted deseaba—diseñada a base de estudios agrotécnicos de sus necesidades y construida para asegurar un funcionamiento eficiente y económico que le permita aumentar sus ganancias.

Con la nueva Cargadora 30-B usted obtiene el siguiente equipo opcional:

CARRILES TIPO DE TRACTOR con gran área de soporte y alto despejo para facilitar su manejo en terrenos blandos, en campos arcillosos o en colinas.

PROPULSION DE VELOCIDAD VARIABLE por motor diesel turbo-alimentado y convertidor de torsión que le permiten trasladarse de un campo a otro fácilmente.

PROPULSION INDEPENDIENTE. El eje transmisor es accionado por engranaje y por cadena, lo que le permite marchar hacia adelante o en reversa, acelera los movimientos y aumenta el trabajo efectivo.

LUBRICACION CENTRALIZADA del mecanismo propulsor que reduce los costos de conservación.

Además, la Cargadora 30-B ofrece, como *equipo de norma*, los siguientes distintivos probados en el campo:

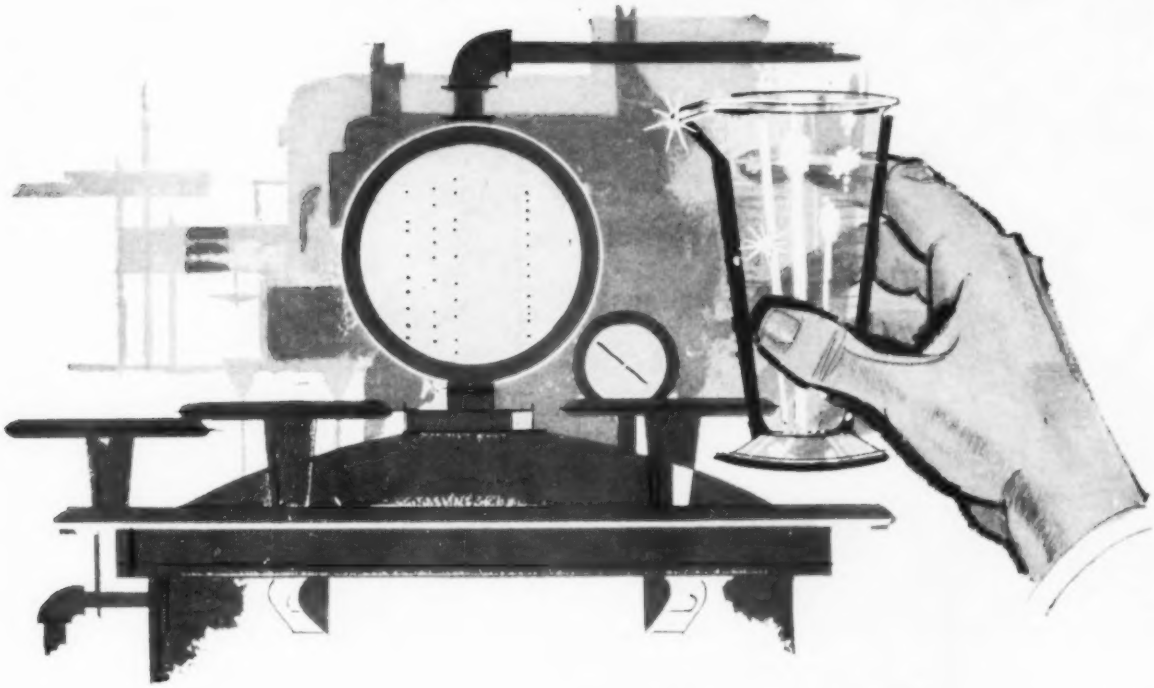
- MANDO NEUMATICO FACIL Y SEGURO DE LOS CABLES DE IZAJE Y SUSPENSION.
- BOTALON RESISTENTE Y LIVIANO.
- CABLES DE ALTA VELOCIDAD que aceleran los trabajos de carga.

Para una demostración, comuníquese con el distribuidor de Bucyrus-Erie en su comarca.

BUCYRUS ERIE®

Construye Mejor Equipo

¡Nuevas Normas de Regulación de la Filtración



hechas posibles por los auxiliares filtrantes **EAGLE-PICHER!**

He aquí la razón:
Las extensas operaciones de la Eagle-Picher en Nevada han hecho nuevamente disponibles *varios millones* de toneladas de diatomita para auxiliares filtrantes de excelente calidad.

Los grados del material son exactamente determinados en la mina mediante "Pruebas Estratigráficas", lo que asegura extraordinaria pureza desde el principio.

La Eagle-Picher produce una extensa gama de grados de auxiliar filtrante en la fábrica de productos de diatomita más nueva y más eficiente del mundo.

Con esta notable "uniformidad de grados", usted puede regular la claridad con exactitud dentro de un régimen de flujo también regulado.

Los auxiliares filtrantes Eagle-Picher vienen esterilizados, son química y físicamente inertes, y no pueden alterar el sabor ni impartirlo.

Usted obtiene perfecta filtración que elimina todos los termófilos y sólidos indeseables dentro de los límites coloidal y submicroscópico.

La pureza sin par de los auxiliares filtrantes Eagle-Picher redunda en menor densidad húmeda y permite cubrir mayor extensión superficial. Los consumidores anuncian importantes economías fabriles.

Muestras para Pruebas y Servicio de Consultas a su disposición. Comuníquese con nosotros cuando quiera, por escrito, telégrafo o teléfono.

EAGLE EP PICHER

Desde 1843

EAGLE-PICHER

The Eagle-Picher Company
Oficinas Generales:
Cincinnati 1, Ohio, E.U.A.

Para datos técnicos y muestras, envíenos el cupón inserto
The Eagle-Picher Co., Depto. SYA-11, Cincinnati 1, Ohio, E.U.A.

☐ Sírvsense enviar más información
☐ Sírvanse enviar muestra _____ cantidad
Tipo de producto a filtrar _____

Auxiliar Filtrante a usar para:
☐ Filtración primaria ☐ Precapa
☐ Alta claridad o acabado ☐ Mezcla

NOMBRE _____ CARGO _____
EMPRESA _____
DIRECCION _____ CIUDAD _____
ESTADO O PROV. _____ PAIS _____

Note cómo el herbicida "Karmex" aplicado en la hilera controla las malezas en este campo de caña.

Menos Costos—Mejor Control de Malezas en la Caña con KARMEX de Du Pont

Los cultivadores de caña de azúcar pueden controlar las malezas de hoja ancha y de gramíneas eficaz y económicamente, aun en regiones de bajo costo de mano de obra, con un programa basado en el herbicida diurón "Karmex" de Du Pont.

"Karmex" es un herbicida de preemergencia que puede aplicarse a la superficie de un campo cultivado antes de la zafra y emergencia de las malezas sin afectar a la caña en forma alguna.

El "Karmex" de Du Pont se ha usado comercialmente en campos de caña desde 1953. Seis años de uso en gran escala, respaldados por la investigación continua y el trabajo experimental, han probado a las claras el control eficaz y las ventajas de reducción de costos del "Karmex".

EL CONTROL QUIMICO DE MALEZAS CON "KARMEX" OFRECE TODAS ESTAS VENTAJAS

- **ECONOMICO**—El "Karmex" elimina el costoso desyerbe a mano—usted reduce sus costos de trabajo en el control químico de malezas con "Karmex".
- **EFICAZ**—Dosis bajas controlan eficazmente la mayor parte de plantitas y semillas germinadas tanto de malezas de hoja ancha como de gramíneas.
- **FACIL DE APLICAR**—El "Karmex" es un polvo mojable y listo para ser mezclado con agua. No es inflamable, ni corrosivo, ni volátil.
- **GRAN RENDIMIENTO**—Cuando las malezas son controladas con "Karmex", la caña saca todo el provecho de las sustancias nutritivas del suelo, de la humedad y del sol—requisitos para un rendimiento máximo. Para obtener más información de cómo el "Karmex" de Du Pont puede ayudarle a controlar económicamente las malezas en sus campos de caña, llene el cupón y envíenoslo.

DU PONT MARCA REGISTRADA **KARMEX®**
herbicida diurón

COSAS MEJORES PARA VIVIR MEJOR . . . GRACIAS A LA QUIMICA

E. I. du Pont de Nemours & Co. (Inc.)
Room 1712, Du Pont Building
Wilmington 98, Delaware, U. S. A.

Sírvanse enviarme información técnica sobre el control de malezas en campos de caña de azúcar con el herbicida diurón "Karmex".

*Nombre*_____

*Compañía*_____

*Dirección*_____

*Ciudad*_____ *País*_____

Las
centrífugas BMA completamente automáticas

son cabalmente diseñadas, sencillas y absolutamente seguras — propias para todo producto. Sus ventajas decisivas son:

- **Economías en jornales**
- **Azúcar de calidad más uniforme**
- **Economías en energía**

Todo el ciclo de trabajo—incluyendo las operaciones de carga y descarga—se realiza por un principio sencillo, completamente automático. El régimen de carga no se basa en la densidad ni en el volumen de la masa, sino en su peso—dentro de una tolerancia de 3%. Estas máquinas se conservan perfectamente limpias, debido a una nueva válvula anular (patentes solicitadas) por donde pasa la masa cocida al centro del platillo distribuidor.

Un solo operador puede atender a toda la estación de centrífugas en una fábrica de azúcar.

BRAUNSCHWEIGISCHE MASCHINENBAUANTALT
BRAUNSCHWEIG/ALEMANIA OCCIDENTAL

BMA

Fábricas completas para: Azúcar de Remolacha • Azúcar de Caña • Alcohol • Butanol & Acetona
Alimentos • Forraje & Levadura • Almidón & Aceites Comestibles.

BMA
116

Detenga la corrosión en sus evaporadores

El Nuevo Devaposal Wyandotte deja su equipo limpio y libre de incrustación . . . sin embargo, es más seguro para los metales. Vea porqué:

Devaposal es un producto de tipo ácido, especialmente preparado para limpiar y desincrustar evaporadores y tachos al vacío. Ha sido probado prácticamente con buenos resultados bajo diversas condiciones en numerosos centrales azucareros en todo Hispanoamérica.

DEVAPOSAL PROTEGE SU EQUIPO

Su acción corrosiva en metales es mucho menos que la del ácido hidroclórico. Devaposal es tan benigno para los metales como el ácido sulfámico —no obstante, trabaja rápidamente y limpia eficazmente.

SEGURO Y FACIL DE USAR

Devaposal es un producto granular blanco que fluye libremente. Se puede manejar con absoluta seguridad—sin peligro de que produzca quemaduras ni lesiones al personal de la fábrica. Ofrece máxima comodidad—no requiere damajuanas, no hay peligro de derrames, no hay que devolver recipientes.

Para obtener datos completos sobre Devaposal, comuníquese con el agente de Wyandotte más cercano, o envíenos el cupón inserto hoy mismo.

Wyandotte CHEMICALS

REG. U. S. PAT. OFF.

J. B. FORD DIVISION

Wyandotte Chemicals Corporation
Depto. de Exportación 3184
Wyandotte, Michigan, E.U.A.

☐ Sírvanse enviarme más información sobre Devaposal

Nombre ..... Cargo .....

Empresa .....

Dirección ..... Ciudad .....

Estado o Prov. ..... País .....

TRACTORES CATERPILLAR*

PREPARANDO TERRENO PARA CAÑA EN PUERTO RICO A RAZON DE

¡2 1/2 CUERDAS POR HORA LISTAS PARA EL SURCADO!

SOLICITE INFORMES A SUS AGENTES AUTORIZADOS

USI **General Equipment Corporation**

Subsidiary of U. S. Industries, Inc.

Oficina y Taller — CARRETERA ESTATAL NUM. 2, KM. 3.7 San Juan, Puerto Rico

(Caterpillar y Cat son Marcas Registradas de Caterpillar Tractor Co.)

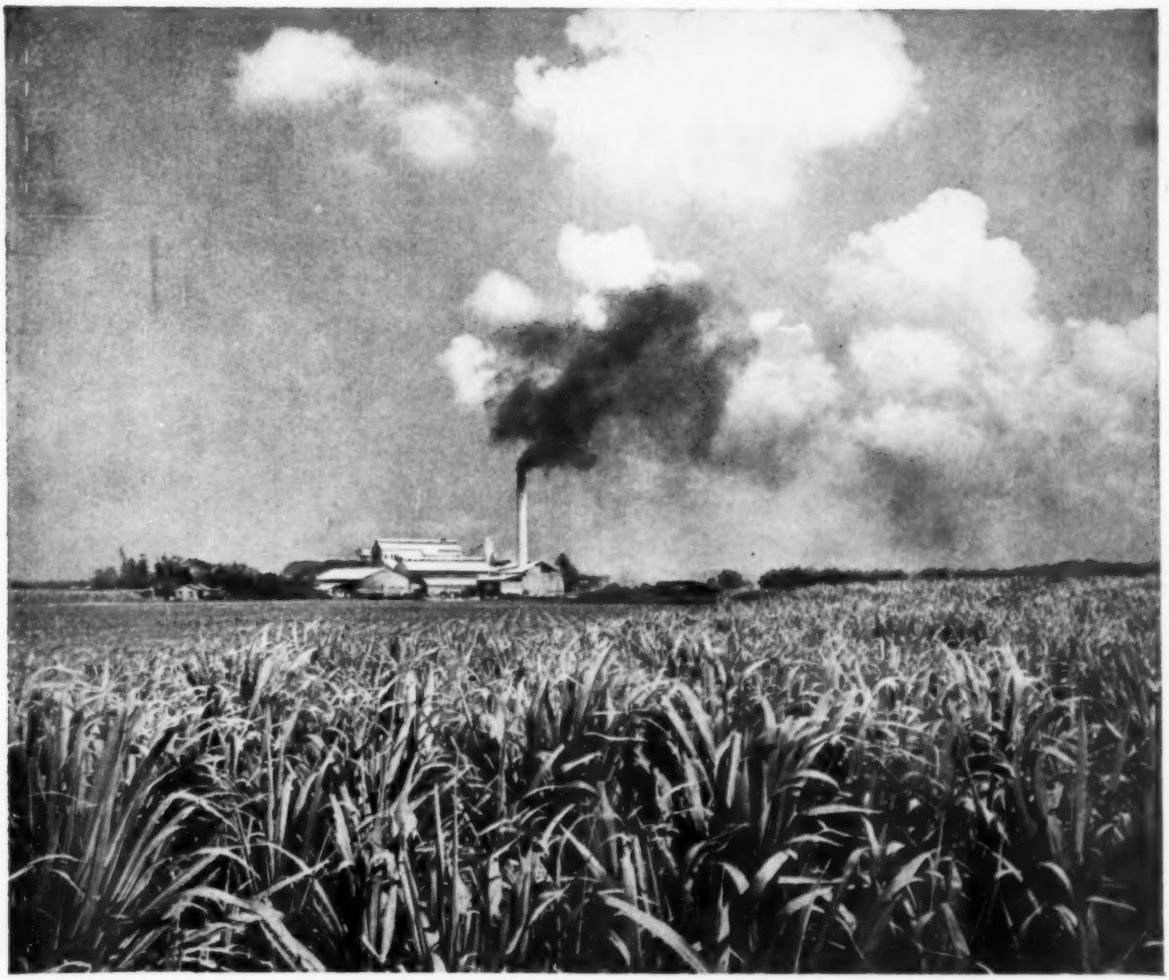
4 PUNTOS QUE TENER EN MENTE!

- Norit consejo práctico donde quiera y cuando quiera que se necesite
- Norit representantes en todos los países para acelerar los embarques
- Norit calidades propias para toda condición local
- Norit carbones activados siempre a precios de competencia

NORIT

NO-4-26

UNITED NORIT SALES CORPORATION LTD. AMSTERDAM - HOLLAND



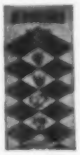
¡PRODUCTORES DE CAÑA!

Mejoren su posición frente a la competencia utilizando los HERBICIDAS DIAMOND

El alza en el costo de producción y la competencia, cada vez más aguda, constituyen dos factores que militan contra las utilidades del productor de caña de azúcar.

Los herbicidas Diamond, por ejemplo, pueden afectar de modo decisivo el rendimiento de sus cosechas y las correspondientes ganancias. Estos herbicidas químicos realizan un trabajo mucho más eficiente que los procedimientos antiguos corrientes que extermina la maleza, — ¡y a la mitad del costo! Es más, al destruir las hierbas que minan el suelo, privando a los cultivos de valiosos elementos nutritivos y del indispensable acervo de humedad — que además dan albergue a multitud de plagas de insectos destructores — y aumentan el costo de la labranza — obtendrá Ud. cultivos *más sanos* y *más robustos*.

Permítanos comunicar su nombre a nuestro distribuidor en esa plaza. El puede suministrarle la información necesaria acerca de los productos agrícolas Diamond — como si fuesen socios comanditarios, que trabajan provechosamente para Ud. Al mismo tiempo podremos enviarle el Boletín PS-001, absolutamente gratis. Este boletín, que trata del mejor modo de utilizar los herbicidas, contiene también cuadros de recomendaciones y muchos otros datos de suma importancia y utilidad para Ud.



Diamond Alkali Inter-American Corporation

ROOM 1614 — 99 PARK AVENUE, NUEVA YORK 16, N. Y., E. U. DE A.

Dirección cablegráfica: DIAMALKALI

PARA LA INDUSTRIA AZUCARERA

Por más de un cuarto de siglo, San Miguel & Compañía, Inc. ha contribuído activamente al mejor desarrollo de nuestra industria azucarera; un factor de vital importancia en nuestra economía. Durante todos esos años San Miguel & Compañía, Inc. siempre ha puesto al servicio de nuestros agricultores de caña, ingenieros de centrales y químicos azucareros la maquinaria y equipo más moderno y eficiente. Así contribuimos a reducir los costos de operación y a obtener un máximo de rendimiento para la industria azucarera.

GARANTIA SERVICIO

SAN MIGUEL & COMPAÑIA, Inc.

78 AÑOS SIRVIENDO A LA AGRICULTURA

aumente su eficiencia de molienda

con **CORONAS DENTADAS FULTON**

MAS DE 1200 CORONAS FULTON CON DIENTES DE ENVOLVENTE LARGOS SE ENCUENTRAN AHORA EN SERVICIO

. . . 600 en Cuba, 175 en México . . . y más de 100 en Puerto Rico, en Ecuador y en Brasil.
Las Coronas Dentadas Fulton permiten mayor variación en los centros de accionamiento. Los dientes largos de envolvente completo engranan suavemente sin chocar. Aminoran las roturas de ejes y permiten mayor reducción del diámetro de las mazas antes de que se necesiten coronas dentadas más pequeñas.
Súmese a la creciente lista de usuarios satisfechos de Coronas Dentadas . . . MODERNICE CON FULTON.

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Perú
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República Dominicana
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DESDE 1852

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IRON WORKS COMPANY
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Division of Central Aguirre Sugar Company (A Trust)

Representantes Para Puerto Rico e Islas Virgenes

MONSANTO CHEMICAL COMPANY, *Productos Quimicos, Productos Plásticos*

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JOHN DEERE INTERCONTINENTAL, S.A., *Tractores, Implementos Agricolas*

YARDLEY PLASTICS COMPANY, *Tuberia Pástica*

KELITE CORPORATION, *Detergentes*

LINCOLN ENGINEERING COMPANY, *Equipo de Lubricación*

HARDIE MAUFACTURING COMPANY, *Rociadoras Mecánicas*

D. B. SMITH & COMANY, *Rociadoras Pequeñas*

Carretera No. 2 Km4 Hm4
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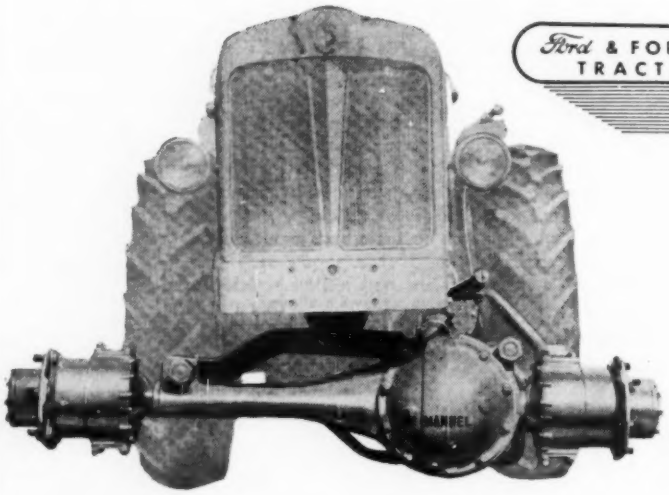
Puerta de Tierra Station
San Juan, Puerto Rico
Telephone 8-1092

P. O. Box 227
Aguirre, Puerto Rico
Telephone 88

Clemente Santisteban, Inc.



Ford & FORDSON TRACTORS

ELECTRIC WHEEL CANE CARTS

APARTADO 4304
San Juan, Puerto Rico
Tels. 6-3371 - 6-3483

CONVERSION "MANUEL" PARA TRACCION DELANTERA ADAPTABLE AL TRACTOR FORDSON MAJOR Y OTRAS MARCAS POPULARES.

Distribuidores Exc'usivos para Estados Unidos y América Latina

los rumores:

Algunos almacenes dedicados a la venta de repuestos para tractor y componentes de los carriles, aseguran que sus piezas son fabricadas en Estados Unidos, Europa, el Canadá, o Latinoamérica, en talleres autorizados por Caterpillar, y que por consiguiente sus productos son de calidad Caterpillar.

la realidad:

- ¡Estas declaraciones son falsas!
- Algunos competidores fabrican repuestos PARECIDOS a los repuestos legítimos Cat, pero en realidad esas piezas distan mucho de ser iguales en calidad. La DIFERENCIA en calidad les pone en condición de poder vender a precios iguales o más bajos que los de los Distribuidores Caterpillar, pero no hay que dejarse engañar por las apariencias.
- Todas las piezas que Caterpillar adquiere de otras compañías, son sometidas a rigurosas pruebas para verificar su alta calidad.
- SOLAMENTE los Distribuidores Caterpillar tienen repuestos que incorporan las mejoras más recientes de ingeniería y fabricación.

CATERPILLAR

Caterpillar y Cat son Marcas Registradas de Caterpillar Tractor Co.

Caterpillar Tractor Co., Peoria, Illinois, E.U.A. • Caterpillar Americas Co., Peoria, Illinois, E.U.A. • Caterpillar Overseas C.A., Caracas, Venezuela • Caterpillar of Australia Pty. Ltd., Melbourne • Caterpillar Brasil S.A., São Paulo • Caterpillar Tractor Co. Ltd., Glasgow, Escocia • Caterpillar of Canada Ltd., Toronto, Ontario

BOMBAS NUEVAS A PRECIOS DE BOMBAS USADAS

1—Bomba Worthington vertical, toda de bronce, 15,000 GPM a 30' de altura, movida por Turbina Terry de 150 CF a 1,200 RPM, aspiración 22", descarga 22". Precio: $2,500.00
2—Bombas Allis-Chalmers verticales, todas de bronce, 12,500 GPM a 24' de altura, tamaño 20 x 20 LSV. Precio: $3,500.00 cada una
1—Bomba Gould vertical, toda de bronce, 3,000 GPM a 25' de altura, 1,125 RPM, aspiración 14", descarga 12". Precio: $1,500.00
1—Bomba Worthington toda de bronce, 3,000 GPM a 50' de altura, 1,200 RPM, aspiración 12", descarga 10". Precio: $1,500.00
4—Bombas Gardner-Denver verticales de 8", todas de bronce, 1,500 GPM a 54' de altura, movidas por motores AC de 30 CF, 230 voltios. Precio: $1,200.00 cada una
2—Bombas Gardner-Denver verticales de 8", todas de bronce, 1,500 GPM a 54' de altura, movidas por motores AC de 30 CF, 440 voltios. Precio: $1,200.00 cada una
1—Bomba Dayton-Dowd vertical de circulación, 425 GPM a 94' de altura, aspiración 5", descarga 4". Precio: $500.00
6—Bombas Buffalo todas de bronce, 100 GPM a 35' de altura, aspiración 3", descarga 2", movidas por motores AC de 2 CF, 440 voltios. Precio: $150.00 cada una
12—Bombas New Chicago verticales de sumidero, de 4", todas de bronce, sin motores. Precio: $250.00 cada una
8—Bombas Worthington de 3 etapas, 500 GPM a 750 LPC, 5,000 RPM, movidas por Turbina Worthington de 300 CF, 450 LPC-575 LPC.
1—Bomba vertical, 500 GPM a 1,150 LPC, movida por turbina Worthington de 500 CF, 800 LPC, 7,000 RPM.
1—Bomba De Laval de 3 etapas, 680 GPM a 750 LPC, movida por turbina De Laval de 400 CF, 440 LPC, 5,000 RPM.
1—Bomba Worthington vertical sencilla, principal de alimentación, tamaño 14 x 9 x 24, 200 GPM a 400 lbs.
1—Bomba De Laval de 3 etapas, 165 GPM a 600 LPC, movidad por turbina De Laval de 375 LPC-440 LPC, 5,000 RPM.
También tenemos en existencia un extenso surtido de turbinas de 1 CF a 9,000 CF, con o sin escape libre.

MARITIME POWER CORPORATION

39 Broadway • New York 6, N. Y., E. U. A. • HAnover 2-3967

Extractos

(Viene de la página 86)

de piedras y fragmentos de hierro, con resultados casi desastrosos.

Durante la siguiente campaña se aplicó agua a la mesa de alimentación, lo que contribuyó enormemente a reducir la cantidad de basura entregada a los molinos. La mesa de alimentación fue provista de un extenso piso para facilitar la expulsión de la materia extraña y del agua.

Durante la campaña de 1955 se aumentó la aplicación de agua a la mesa de alimentación, y debajo de dicha mesa se instaló un sistema más eficiente para expulsar la materia extraña. También se instaló un depósito de asiento para recibir el agua descartada.

En la campaña de 1956 se instalaron en la mesa de alimentación niveladoras de caña más eficientes y se agregaron surtidores de agua adicionales dirigidos directamente a las niveladoras. Debido a la corta duración de la cadena transmisora, la mesa de alimentación fue provista de una cadena de tipo más adecuado y más pesada.

Durante la campaña de 1957 se redujo la altura de la parte posterior de la mesa de alimentación a fin de facilitar la nivelación de la caña. Esto remedió la situación hasta cierto punto, pero la mesa todavía carecía del equipo necesario para remover la cantidad cada vez mayor de basura recibida con la caña. Durante la campaña de 1958 se realizó un detenido estudio con el fin de determinar la cantidad de basura entregada con la caña y le mejor forma de eliminarla.

Para la campaña de 1958, la mesa de alimentación fue totalmente reconstruída, agregándole un movimiento volcador y una serie de rodillos para eliminar la basura. Este sistema funcionó satisfactoriamente durante la campaña de 1958. Ahora se están efectuando ciertas mejoras en dicha mesa, pero será esencialmente la misma mesa para la campaña de 1960.

En el Central Machete se está instalando una mesa similar para la próxima campaña de molienda.

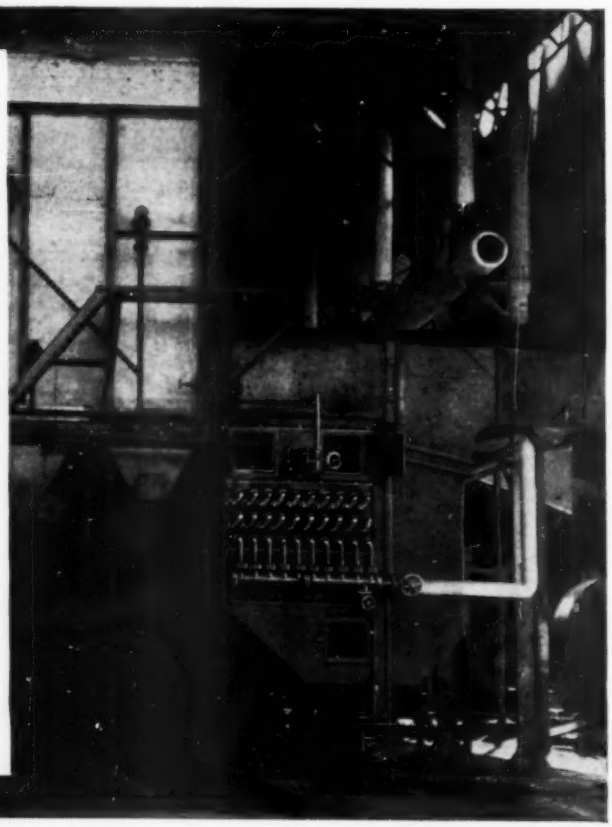
Mas vapor con un

Si necesita más vapor urgentemente (o si tiene que reducir el consumo de combustible complementario), la instalación de un Economizador Green le puede ayudar a resolver el problema a un costo que se traduce en una inversión lucrativa.

Instalado en la Nicaragua Sugar Estates Ltd.

E. GREEN & SON LTD. WAKEFIELD
INGLATERRA

Fabricantes de economizadores durante más de un sigl-



Oferta de Acciones de la C & D

El Sr. W. J. McGregor, presidente de la Canada & Dominion Sugar Company, anunció que a principios de la semana que viene los accionista de esta empresa recibirían una oferta formal de la Tate & Lyle Ltd. de Londres—los principales refinadores de azúcar en el mundo—a través de la Triarch Corporación Ltd. de Toronto, Canadá. La oferta, al precio de $25 canadienses por acción del 50% de las acciones de la C & D emitidas pero que aún no están en manos de Tate & Lyle, deja en manos de los accionistas actuales una importante participación. La oferta quedará abierta hasta el 12 de noviembre, y sujeta a una oferta formal mínima de pago de 593,370 acciones. Los accionistas individuales tendrán la opción de ofrecer más del 50% de sus acciones, pero ello dependerá del número comprometido y de la proporción de tales ofertas adicionales aceptadas. La oferta revela que el número de acciones en manos del grupo Tate & Lyle asciende a 197,130. Los directores de la C & D piensan recomendar a los accionistas que acepten la oferta. La Triarch Corporation tiene como teneradores de acciones bancos en Londres y Nueva York y prominentes individuos en el Canadá.

■

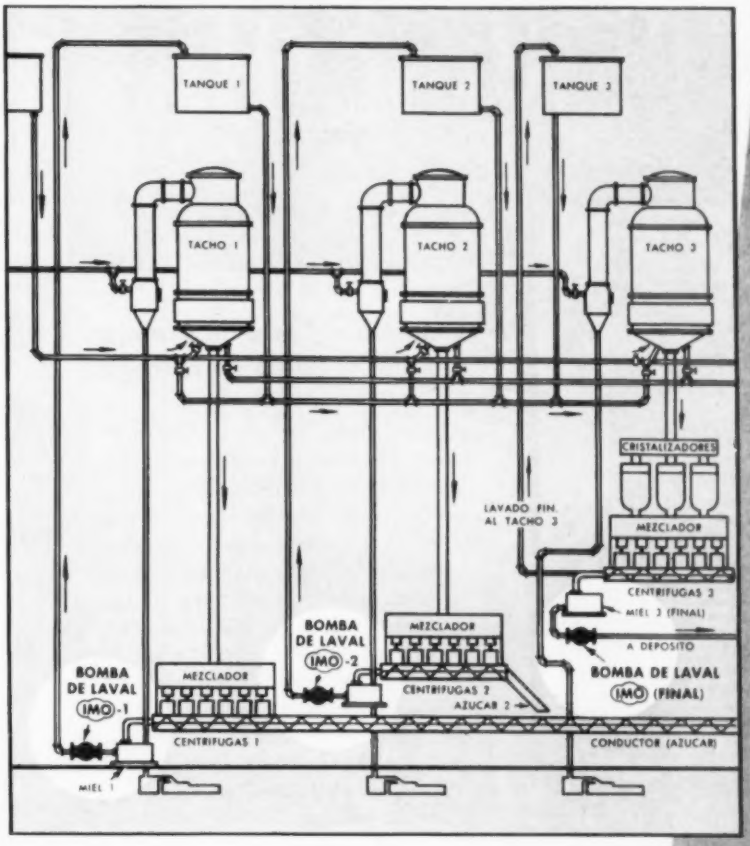
"Castro Recibe la Cuenta"

La enorme carga económica impuesta por la reforma agraria, que el Dr. Castro de Cuba declara se basa en su revolución del 26 de julio, es analizada bajo el título de "Castro Gets the Bill" en la edición del 29 de octubre del "The Reporter" publicado en Nueva York. El artículo, por R. Hart Phillips, advierte que las tierras de centrales norteamericanos y cubanos no serán expropiados hasta después de la zafra de 1960; no obstantes, los terratenientes norteamericanos están destinados a perder 1.6 millones de acres y los cubanos unos ocho millones, posiblemente sin compensación adecuada. Cuando el Instituto de Reforma Agraria dirigido por el Dr. Castro y administrado por el Dr. Antonio Núñez Jiménez, proceda a repartir estas tierras y a pagar a los trabajadores jornales superiores a los que pagaban los terratenientes, los costos ascenderán a millones por semana.

El artículo advierte que el sobrante de la zafra de 1959, agregado al exceso de 1960, pueden dar por resultado que el gobierno de Cuba tenga que financiar la retención de gran parte de este sobrante, aumentando con ello los costos de operación de la industria azucarera, lo que vendrá a recaer en el gobierno. Las colonos le han pedido al gobierno que se apodere de aquellos centrales que aún no han liquidado sus deudas con los colonos. Al acceder a estas peticiones, el gobierno tendrá que financiar más centrales. El punto in-

BOMBAS DE LAVAL IMO

Las bombas confiables De Laval IMO satisfacen los requisitos exigentes de bombear la melaza.



El bombear la melaza viscosa requiere una unidad calculada para este servicio. La bomba DE LAVAL IMO con su hélice exclusivo y diseño de polea de guía se ha probado ser sobresaliente para este servicio exigente.

Las bombas IMO libres de dificultades han estado en operación por muchos años en las refinerías principales por todo el mundo.

Si Ud. nos dice sus requisitos — cuántos galones bombea, cuál es la viscosidad, etc., nos agradaría darle más información.

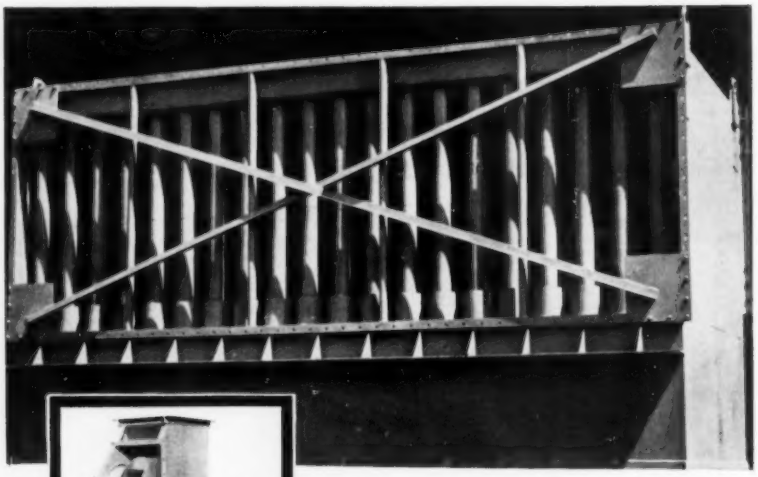
DE LAVAL

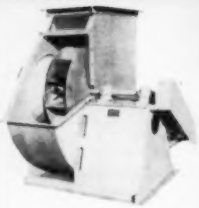
DE LAVAL STEAM TURBINE COMPANY
Nottingham Way, Trenton 2, New Jersey, E.U.A.

COLECTORES

DE POLVO "WHIRLEX"

Armados en el Taller . . .





VENTILADORES WHIRLEX DE TIRO INDUCIDO

con tubos de evacuación autoestables, disponibles para múltiples fines en calderas—incluyendo calderas encendidas con bagazo. El eje montado en manguitos de enfriamiento especiales permite emplear cojinetes enfriados por aire. También se pueden suministrar cojinetes enfriados por agua, si se desean.

. . . Eliminan el Costo de Armaje en el Punto de Entrega

Los colectores de polvo "Whirlex" están diseñados para efectuar la colección de polvo con máxima eficiencia en cada aplicación. Estos aparatos son fabricados y completamente armados en el taller; sólo hay que instalarlos en el local y empernar las tolvas. Cada colector Whirlex es cuidadosamente examinado antes de salir del taller, lo que asegura instalaciones absolutamente herméticas al gas. Con los colectores de polvo Whirlex, las contaminaciones del azúcar y los costos de consvervación de la maquinaria se reducen al mínimo.

A solicitud enviaremos datos más completos

Fly Ash Arrestor
CORPORATION
202 North First Street Birmingham, Alabama, E.U.A.

Colectores de Polvo • Ventiladores de Tiro Inducido
Ventiladores de Tiro Forzado
Ventiladores Eductores Tubos Autoestables
Trabajos Tubulares

FLY ASH WHIRLEX ARRESTOR

terpuesto por el artículo es "¿Cómo obtendrá el Dr. Castro los fundos necesarios para su reforma agraria y para la industrialización que él reitera es 'Ineludible'"?

Como el gobierno de Cuba no piensa pedir ayuda económica de fuentes en el exterior, el Dr. Castro se propone levantar el capital necesario entre el pueblo cubano mediante la venta de bonos industriales, pero, dice el Sr. Phillips, estos valores han tenido muy poca aceptación.

■

Próxima Reunión de Técnicos de la Industria Azucarera en 1960

Los Técnicos de la Industria Azucarera (Sugar Industry Technicians) celebrarán su 19ª Reunión Anual en Nueva York del 8 al 10 de mayo de 1960, inclusive. Tal como lo hicieron en la 18ª Reunión Anual, el primer día, domingo 8 de mayo, será dedicado a juntas de la Directiva y de los diversos comités. Las sesiones técnicas serán celebradas el lunes, 9 de mayo, con un banquete por la noche. El martes, 10 de mayo, se celebrarán más sesiones técnicas, las que terminarán en la tarde con un simposio. El programa seguirá las normas establecidas en la 18ª Reunión Anual (SUGAR y AZÚCAR, Mayo 1959, páginas 64-65); en ediciones subsiguientes se publicarán más detalles según se reciban. El Sr. E. J. Culp, director técnico de la American Sugar Refining Company, es el presidente de S.I.T., y el Sr. E. W. Harris es el secretario ejecutivo, cuyas oficinas se encuentran en el 150 Nassau street, Nueva York 38, N. Y.

■

Folleto en Español Sobre Válvulas y Accesorios

Las válvulos y accesorios para tuberías hechas de material plástico o de polivinilo rígido, que están adquiriendo cada día más popularidad en fábricas y refinerías de azúcar, se encuentran descritas en un folleto en español publicado por la Walworth Company para su distribución entre la industria azucarera de hispanoamérica. Las válvulas y accesorios de este tipo han resultado ser útiles en el caso de líquidos corrosivos o abrasivos. Ejemplares de este folleto en español se pueden obtener sin costo alguno de la Walworth Company o del Depto. de Libros de SUGAR Y AZÚCAR.

■

La Reunión de la A.S.S.B.T.

El Sr. Ralph Wood, a cargo del programa de la 11ª Reunión General de la Sociedad Americana de Tecnólogos en Azúcar de Remolacha, anuncia que hay prometides 150 trabajas. La reunión se calebrará febrare 2 a 5, de 1960 en Salt Lake City, Utah (E.U.A.).

South Puerto Rico Sugar Corp.

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MARCA

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Capacidad Fabril

(Viene de la página 79)

son unas 8,333,333 tons. azúcar. Si muelen 200 días al año entonces la capacidad promedia de central es unas 1,500 tons. per día. Estos son datos aproximados del 1956.

7. Los valores de la propiedad renglón 14 son para 1953 a un 71.4% de condición mecánica. El costo nuevo de estas propiedades en 1959 sería el doble de lo indicado. Las tierras también serían más o menos el doble en 1959.
8. Capacidad promedia de las centrales en operación en Puerto Rico para 1950 era nominalmente 3,072 T/D. En 1959 esta cifra probablemente se acerca a 3,200 T/D.
9. Tamaño de una cosecha de una central de larga zafra.
   3,200 T/D $\times$ 600 D = 640,000 T ($\times$ 16 = 10,240,000 Tons. cosecha total)
   1,700 T/D $\times$ 200 D = 340,000 T ($\times$ 30 = 10,200,000 Tons. cosecha total)
10. Según me ha llamado la atención el amigo Pedro González Orama los costos variables de jornales cambian con el precio del azúcar, pero aunque esto es un apunte importantísimo la comparación entre las varias economías azucareras no sufre gran distorción al omitirse este detalle.

■

Subsidiaria Inglesa de la Merrick Scale

La combinación de transportador y sistema de peso continuo extensamente en uso en la industria azucarera, principalmente para pesar cosetas de remolacha y bagazo, será fabricada en Inglaterra por una subsidiaria de la Merrick Scale Manufacturing Company de Possaic, N. J. La firma inglesa operará una fábrica en Nottingham bajo el nombre de Merrick Scale Manufacturing Company Ltd.

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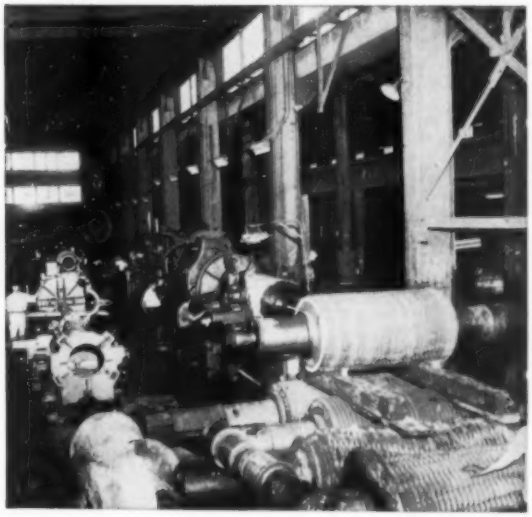

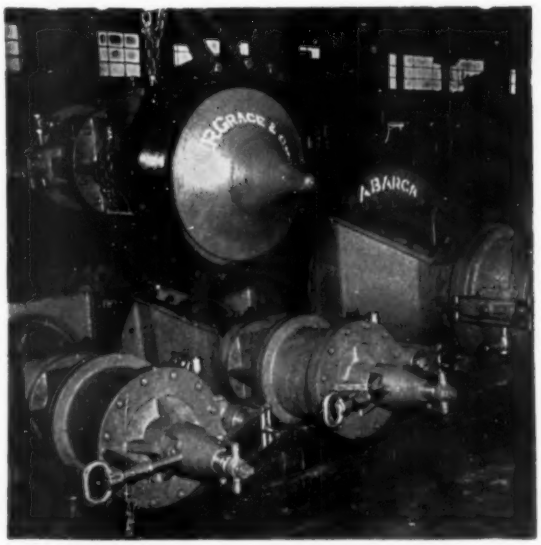

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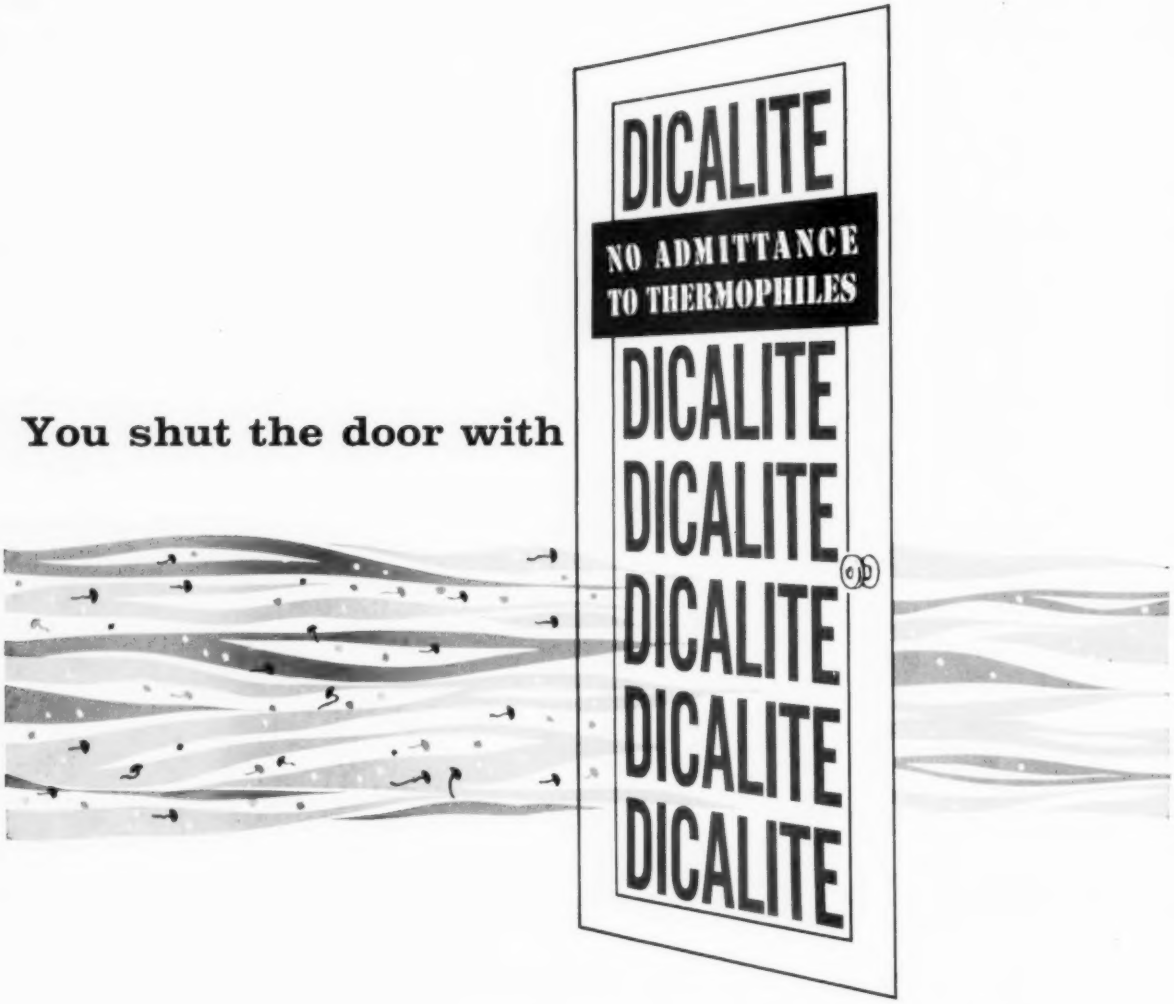

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